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Alberta
ENVIRONMENT

Annual Report For the Year Ended March 31, 1983

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Alberta

ENVIRONMENT

403/427-2391

132 Legislative Building
Edmonton, Alberta, Canada
T5K 2B6

Office of
the Minister

The Honourable G. Amerongen,
Office of the Speaker,
Legislative Assembly of Alberta

Sir:

I have the honour to hereby transmit the Annual Report of the Department of the Environment for the year ended March 31, 1983.

Respectfully submitted,

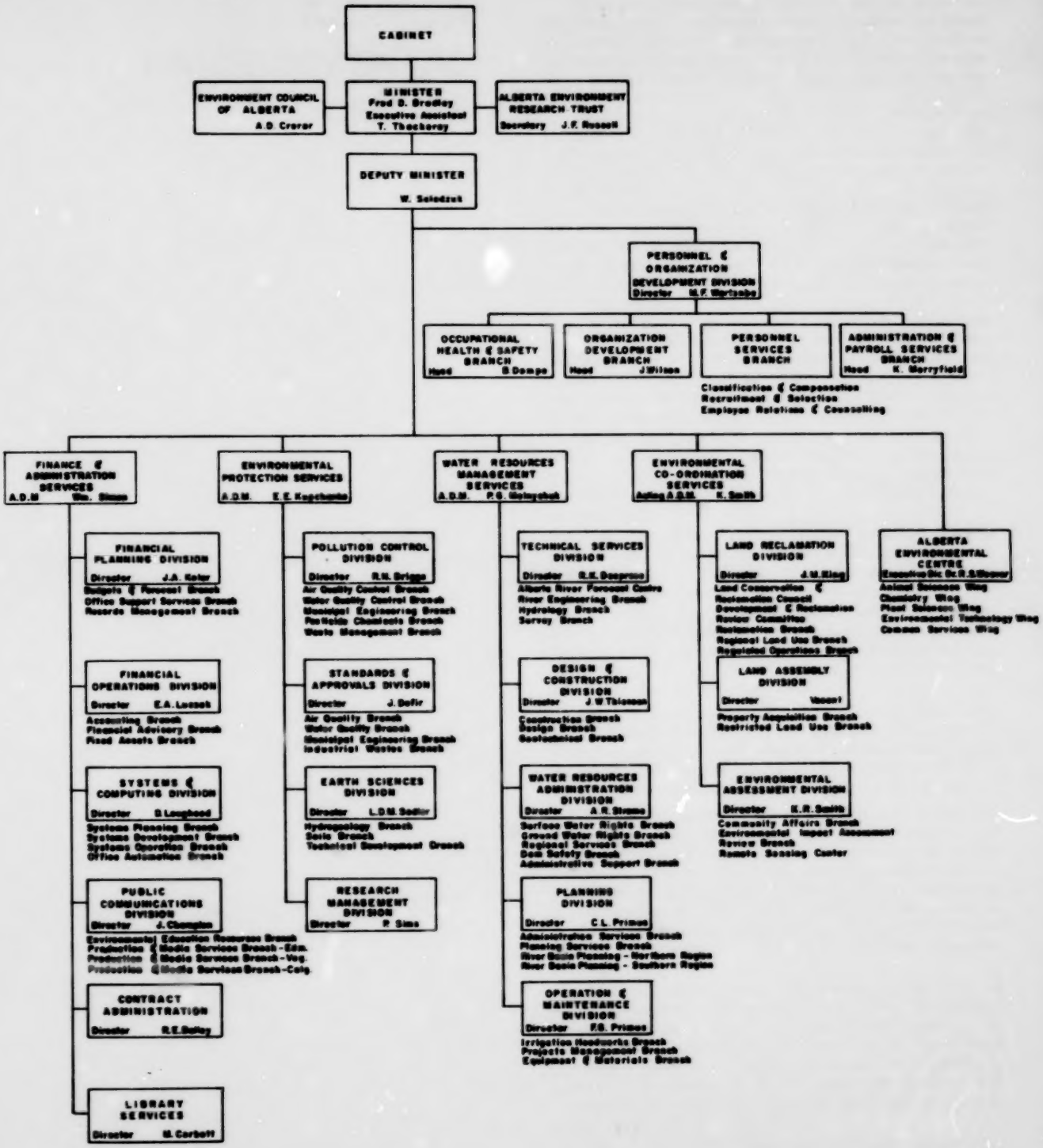
Fred D. Bradley
Minister of the Environment

OFFICE OF THE DEPUTY MINISTER

Walter Solodzuk, P.Eng.
Deputy Minister

Sherman Weaver, Ph.D.
Director
Alberta Environmental Centre

Morgan Wartombe
Director
Personnel and Organization Development



March, 1983

Alberta ENVIRONMENT

ALBERTA ENVIRONMENTAL CENTRE

The Alberta Environmental Centre in Vegreville provides environmental research, services and technical development for Alberta Environment and other client departments and agencies of the Government of Alberta. During 1982-83, work proceeded in eight major program areas and under 48 separate programs, with over 100 projects under way.

Staff worked on problems throughout the province, from Cardston to Fort McMurray and the Peace River country. The projects involved all of the Centre's four scientific/technical wings — Plant Sciences, Chemistry, Animal Sciences and Environmental Technology.

Efforts continued toward developing difficult but potentially rewarding interdisciplinary research methods, bringing together scientists from several fields to address environmental concerns. Progress in this area included the establishment of interdisciplinary project teams to study subjects such as chemical agents of concern in Alberta waters.

An increasing workload focussed on environmental subjects of widespread public concern in the province. This included a growing number of emergency and legal chemical analyses and participation of Centre staff in environmental court cases. In addition to routine air and water monitoring, the Centre worked on questions concerning acid rain, mercury contamination and pesticides.

As well, the Centre continued planning and development to address the long-term effects of exposure to low concentrations of hydrogen sulphide and sulphur dioxide. Also, preliminary plans were made to assess and minimize the effects of pulp mill effluents on water quality.

Some work, such as a survey of chemicals in fish tissues in Alberta waters, neared completion with publication of reports on findings. Other work, such as investigating innovative methods of removing sulphur from stack gases, was in the early stages.

An active agricultural orientation was maintained, particularly by the Plant Sciences Wing, which acts as Alberta Agriculture's Regional Crops Laboratory for northeastern Alberta. Activities centred on research, surveys and education for optimum pest control with minimal environmental disruption.

Staff continued programs of public involvement through agricultural extension activities, a seminar series, co-hosting an aquatic toxicology conference and holding a well-attended open house at the Centre. Staff also provided information to groups and individuals considering a hazardous wastes treatment site for the province.

Demand for Centre analytical and diagnostic services increased. Over 300,000 individual chemical tests were performed on air, water, sediment and similar samples. Requests for plant disease and plant and insect identification services were also up, particularly in the chemical damage investigation service, which is unique in Western Canada. These services were provided not only to government departments and agencies but also more directly to the general public through Health Units, district agriculturists and other intermediaries.

Major equipment purchases were completed, providing the facilities needed for program development. These included plant growth chambers, a fermenter, an electron microscope and an incinerator for waste handling. As well, some of the computer hardware required for a program of systems development was obtained. Development on the 300-hectare site continued with construction of a temporary large-animal-holding facility, coyote and skunk kennels and cattle shelters.

The Centre's reverse osmosis water treatment plant was operated at 13 cubic metres per day, providing pre-treated water for laboratory operations. Equipment and process changes were required to accommodate the switch in water source from Vegreville to Edmonton.

Administrative functions included preparing and overseeing a budget of $11.3 million. Contracts were prepared for a new training and development grant program allowing promising students

to do post-graduate research at the Centre on subjects within the Centre's mandate. Two students were awarded grants under the program.

The program areas at the Centre represent groupings of activities with common characteristics, as follows.

Analytical, Diagnostic, Extension and Technical Services

An increased number of insect, weed and plant disease specimens was received for identification and control recommendations. Table 1 shows a 49 per cent increase over last year in water, soil and plant samples examined in cases of suspected chemical damage to plants. Staff also conducted several greenhouse experiments on the detection of herbicide residues in soil and 36 field trials on effects of herbicides and their soil residues on plants.

Table 1
Diagnostic Services Provided in Plant Sciences
Number of Specimens Processed

	1980-81	1981-82	1982-83
Insects	597	592	678
Plant diseases	931	1027	1370
Weeds	360	315	329
Chemical damage	554	730	1085

Plant disease, insect and weed educational and advisory activities included participation in training seminars and field days, as well as short course presentations to college and university students, greenhouse operators, ranchers, farmers and home owners. Timely information on pest problems and control was communicated to producers through press releases and radio broadcasts. Thirty-two plant disease information leaflets were prepared, and an extension booklet "Biological Pest Management for Interior Plantscapes" was published and made available for distribution. A handbook on "Weeds of Alberta" was also co-produced with Alberta Agriculture.

Demand for water analysis services also increased, with 12,875 samples being analysed for 215,500 chemical parameters. Included were 10,208 drinking water samples tested for provincial health units and 2,351 other samples from the Pollution Control Division of Alberta Environment. An increasing number of Pollution Control Division samples was submitted on a rush or emergency basis, and the number of legal samples handled was also up sharply. A further 960 samples were analysed for some 20,200 chemical determinations in support of Centre projects, and 1,216 samples were tested in a nutrient study of selected Alberta water bodies.

In support of Alberta Environment air quality and agricultural chemicals legislation, staff analysed both stack and ambient air samples from locations throughout Alberta. Six-hundred-and-fifty-nine tests were performed on 278 stack samples and 11,585 tests were carried out on 7,041 ambient air samples.

In a co-operative study with the Research Management Division of Alberta Environment, precipitation studies involved routine analysis of 106 rain samples and 348 rain and snow samples. A priority pollutant scan was introduced for non-pesticide organic compounds that have been identified as environmentally harmful.

Specialist services in several fields were provided to government departments and the public. Some examples: staff helped government departments with identification of vertebrate pests; live capture of California bighorn sheep and mountain caribou was undertaken; and toxicology advice was provided on blindness in calves and on heavy ergot infestations in rye and other grains. Laboratory studies were conducted on a fungal toxin to investigate treatment of animals that have eaten contaminated foodstuffs. In support of Centre projects, a microbiological identification service performed 10,750 tests using an expanded identification capability. Instrumentation and procedures for the Centre's radiocarbon and tritium dating laboratory were developed to the point where samples could be accepted for analysis.

Pest Management Research and Development

Activities in insect, weed and plant disease management and pesticide analysis were primarily aimed at reducing pest problems while limiting environmental problems.

Insect research centred on livestock, field crop and ornamental plant pests. Work on ornamentals included research on the use of natural insect control agents to combat pests in the Muttart Conservatory in Edmonton, where good control of important greenhouse pests was obtained. Preliminary trials were completed on chemical control of chrysanthemum leafminers in greenhouses and on root maggots in rutabagas. An annual survey for native and European elm bark beetles (carriers of Dutch elm disease) again detected no beetles.

Developing a bertha armyworm larval sampling system and research on sex hormone-baited traps for monitoring bertha armyworm moths were among projects in field crops pest research. As well, canola crops were surveyed for root maggots, and a study of the insects' impact on canola was started. Other work on canola pests included trials on chemical control of flea beetles. In the Peace River region, traps baited with sex hormones were used to monitor clover cutworm moths.

Livestock pest research was undertaken on the impact of horn flies on range cattle productivity and on the use of new methods for chemical control of the flies. Staff tested new products for controlling flies in hog barns and biting flies on horses. The use of whole-body insecticide applications to protect cattle from black flies was investigated. A province-wide survey of commercial hog operations for the incidence and severity of swine mange was initiated.

Fifty-three field experiments tested barley tolerance to herbicides, weed and volunteer cereal control in rapeseed, weed control in cereals and rotational crop tolerance to soil herbicide carryover. Greenhouse studies were conducted to determine herbicide residues in soil. Weed biology and ecology investigations studied longevity in the soil of 18 weed species, weed seed germination, and emergence and growth characteristics of hempnettle, cleavers and scentless chamomile. Competitiveness of tartary buckwheat and wild oats with crops was also studied. As well, imported insects — screened by Agriculture Canada's Regina Research Station — were released in two locations, one near Cardston for control of leafy spurge and another near Wainwright for perennial sow thistle control.

Plant pathologists completed field trials on control of root rot and smut in barley, root rot in wheat and damping off and seedling blight in canola. Laboratory tests were carried out to study the direct action of 10 herbicides on disease development in cereals. Soils near Smoky Lake were sampled for studies on the connection between sulphur deficiency and "alfalfa sickness". Staff co-operated in the 1982 provincial Verticillium wilt survey, testing 86 fungal isolates.

Environmental Toxicology

Research continued into possible connections between sulphur emissions from sour-gas processing plants and certain livestock diseases. As part of this research, a pilot study was conducted on two beef and two dairy farms in west central Alberta. Analysis of forage, feed and grain from the test sites indicated that homegrown crops were generally low in selenium, sulphur, zinc and copper. Soils were generally deficient in selenium and sulphur. Results suggest that trace element deficiencies in feed are due to

naturally low levels in the soil rather than to the deposition of sulphur.

The pilot study was followed with a questionnaire survey on the incidence of nutritional diseases in cattle in Alberta. Replies from veterinarians failed to show a significant difference between areas either nearby or far from sour-gas processing plants.

In related work, tests were developed to determine the correlation between the presence of specific enzymes and selenium, copper and zinc in cattle blood. Over 300 blood samples were collected from various locations as part of a baseline study of enzyme activity levels and exposure to sulphur compounds.

Facilities were established for studies with animals on the toxic effects of inhaling gases, vapors, particulates and aerosols. Design and specifications for a Toxicology Containment Laboratory were advanced to the tendering stage. In addition, four laboratory rooms were modified to provide space for initial hydrogen sulphide inhalation experiments, and a large chemical fume hood was obtained for sulphur dioxide exposures. A related activity was the safety training of staff for use of the hazardous chemicals associated with the program.

Plans were completed for inhalation studies on the health effects of sulphur emissions. Trials with hydrogen sulphide were set up to provide data on several biological characteristics in laboratory animals. The data will eventually lead to information on topics such as long-term health effects of hydrogen sulphide at occupational exposure levels. Similar studies were planned to determine the effects of sulphur dioxide.

A Toxicology Information Services Project was implemented to provide toxicological information on chemicals of environmental concern. The information sources include microfiche, computer data bases, periodicals, reference texts and other libraries.

A workshop on risk assessment was co-sponsored with Alberta Workers' Health, Safety and Compensation.

To develop tests to detect mutations caused by chemicals, a program on the growth and maintenance of cell cultures was started. A detailed review of the scientific literature was undertaken for chemicals of environmental concern, with particular emphasis on aquatic life. As well, literature on short-term biological tests for mutagenesis was reviewed.

Staff compiled a report on the 35 most-used pesticides in Alberta, summarizing information and identifying gaps in available information. The report was followed by an examination of potential interdisciplinary research projects on pesticides at the Centre.

Following a farmer's accidental insecticide poisoning of several cattle, a field study was started in co-operation with Alberta Agriculture's Regional Veterinary Laboratory at Airdrie to determine the effect of breed, age and sex on baseline levels of an enzyme important in nerve impulse transmission.

Water/Wastewater Management Research and Development

Four projects were carried out in a program on the toxic effects of industrial, municipal and agricultural wastewaters on aquatic life, particularly fish. Twenty-six biological tests monitored the toxicity of effluents to rainbow trout, providing data for provincial licensing and enforcement programs.

Over 3,000 fish collected from 25 lakes and rivers in Alberta were analysed for the presence of 43 pesticides, their derivatives and methyl and inorganic mercury. No evidence of significant contamination was discovered except in the North Saskatchewan River where some elevated levels were found for mercury from natural sources.

Effects of lindane on survival and early development of rainbow trout were examined in exposure tanks. Trout eggs and fry were exposed to lindane at concentrations found in many North American rivers. As well, investigations of the pathological effects of waste water were carried out, involving sampling of fish, effluent, water and sediment from an industrial discharge site.

In research to identify toxic portions of industrial effluent, an effluent was separated into component parts and each part was tested for toxicity to fish. Some portions were more toxic than others, a finding which may lead to highly specific waste treatment methods.

An interdisciplinary committee was formed to report on substances of environmental concern in Alberta waters. The committee report identified a lack of information on several chemicals likely to be found in Alberta waters. A comprehensive survey of industrial chemicals in provincial waters was started.

A project was undertaken to evaluate processes at the Sam Livingstone Hatchery in Calgary to identify design and operation problems causing fish kills. The study found operating problems were causing low dissolved oxygen concentrations.

Work started on the impact of pulp mill effluent on receiving water, especially drinking water. A workshop was scheduled to gather and assess existing information and exploratory tests were carried out on a microbial color removal process.

Waste Management Research and Development

Planning, equipment purchases and preliminary work began on the evaluation and development of economic processes for dealing with Alberta's waste management problems. A solid/liquid incinerator was acquired and tested and plans were made to upgrade it to a pilot unit to evaluate the best ways of burning wastes.

Preliminary studies were undertaken on the technical feasibility of processes to remove sulphur from industrial gas emissions. Due to the presence of magnesite deposits in Alberta and the high value of the byproducts produced, initial work concentrated on sulphur dioxide scrubbing using magnesium-based processes.

A survey was started to determine which of Alberta's wastes are suitable for incineration, scrubbing or fixation. Results will be used to identify potentially useful treatment processes and to rank wastes to be tested.

Twelve cattle feedlots in central and southern Alberta were visited, and four were selected as final sites for a study of the microbiology of feedlot runoff into water. Samples were collected and tested to determine microbiological and chemical characteristics of waters influenced by feedlot runoff. Six surveys were conducted and 42 samples were analysed for 400 characteristics.

Procedures for using bacteria in toxicity tests were modified and evaluated. Some 235 such tests were performed on industrial effluents and on various metals and their mixtures, using two different bacterial test systems.

A detailed operating plan for a cellulose biotechnology research project was prepared. The plan proposed research on the biological conversion of abundant waste materials such as aspen wood and straw into more useful products such as cattle feed. Investigation of a conversion process, easily adopted at the farm level, was recommended.

Portable data loggers and thermistor probes were received and field-tested in a project on the microbiology of landfill sites. Construction of wells to measure landfill temperatures and gas production was started.

Living Natural Resources

Thirty-nine bears were captured and 26 fitted with radio collars for research in the Berland River area and to collect data needed for the management of wildlife and forest resources. Weekly monitoring of collared grizzly and black bears continued from April to September, facilitating the recording of the animal's movement patterns and habitat relations; the collection and analysis of information on the animals' physiology and other data such as

weight, age and other characteristics; and the location and examination of collared bears' dens.

Selected habitats were examined and classified in preparation for an initial remote sensing analysis of the bear-study area. In conjunction with G.L. Langford and Associates and Alberta Environment's Remote Sensing Centre, information was generated on a preliminary vegetation/cover-type map of the study area, major land-use changes between 1976 and 1982 and all human access patterns and activity in the area.

Prototypes for two new data-gathering systems were completed. These were a remotely activated video-tape recorder for animal behavior research and a portable recording instrument for physiological monitoring of trapped animals.

Laboratory work progressed on research to predict the impact of environmental disruptions on moose distribution and food supply in northern forests. The laboratory phase of the study included analysis of moose browse samples collected in the Swan Hills area.

Progress was also achieved in the development of a nutritional research capability with live animals. Three elk donated by the University of Alberta were trained and two elk calves were hand-reared for intensive handling. The elk were moved to a temporary large-animal facility built on a Centre site.

A resource evaluation was completed on a potential site for a confined field facility near Ministik Lake to study animal-range relationships. A resource description of the area and identification of specific sections suitable for facility development were completed.

In co-operation with Parks Canada, collection of moose carcasses from Elk Island National Park was completed. Laboratory work was begun to collect data on seasonal organ and tissue changes and on tissue loads of specific chemicals. Analysis of this data was started.

Problem wildlife research included work on control of pocket gophers, sheep predation by coyotes and chemical control of problem wildlife. Three field trials were conducted using orphan lambs with toxic collars in flocks where coyote predation was occurring. Further work involved: evaluation of chemicals to replace strychnine for coyote and skunk control; field work to determine if lamb size, color, breed and number of lambs per litter predisposes lambs to attack by coyotes; testing pocket gopher poisons; and studying movement of pocket gophers on to newly established legume fields.

Research was also planned on movement and energetics of goldeye in the North Saskatchewan River and on the effects of water drawdown on growth, longevity and reproduction of walleye.

Land Reclamation Research and Development

The Centre's first reclamation study was begun in 198[illegible] under AEC's new Research Development Grant for graduate students. The general objective was to document and assess selected plant community (ecosystem) responses to pipeline installation through solenetzic rangeland in southern Alberta. The study is being done in a corridor of five adjacent rights-of-way of lines installed in 1959, 1963, 1969, 1976 and 1981. The last one is a segment of the 106.7-cm (42-inch) diameter Alaska Highway Pipeline.

Arrangements were made for the transfer to Vegreville of a native grasses research project initially funded at the University of Alberta by the Alberta Reclamation Research Technical Advisory Committee. The project will eventually be phased out of the university and into the Centre.

In the spring of 1982, the Centre entered into an agreement with Alberta Environment for the transplanting and maintenance of some 12,000 seedlings of several native prairie forbs. Seed had been collected and seedlings grown by the Devonian Botanical Garden. Several more species will be transplanted in 1983. The Centre will decide by the fall of 1984 whether to take over management of that project.

Administration Support

This program area provided the various administrative and technical support services required for conducting research, service and technical development activities. This included the central support functions of the Common Services Wing plus administrative support provided by individual scientific and technical wings.

Capital facility development projects undertaken or planned included design of the $900,000 first phase of an inhalation toxicology research laboratory. Some laboratory areas were upgraded to accommodate new programs, and new animal holding facilities were built on the grounds.

Routine site development and maintenance activities included landscaping, field-plot preparation and development of revegetation plots.

The central support function of the Common Services Wing was provided in the following areas:

Financial Services — Financial services provided the support required to purchase, receive and store goods and services. This involved processing a large volume of requisitions, acquisition proposals and invoices, and receiving, storing and distributing the materials. The volume increased by about 25 per cent over fiscal year 1981-82.

The Central Stores operation occupied new space in the Services Building and introduced a new operational system. A fixed-asset control system was introduced, and inventory control procedures were developed.

Administration — Preparation of budget documents and monitoring and expenditure of approved funds were the major functions in this category. This included preparation of a regular Alberta Financial Information System (AFIS) budget and a program budget for the Centre's Board of Directors. The 1982-83 budget was $11.2 million.

Progress was recorded in the areas of financial forecasting, equipment acquisition and preparation of master agreements for the Centre's new research development and training grant program.

Information Services — The library acted as the Centre's focus for collection of published information on scientific and technical subjects of concern to staff. As well as maintaining a collection of serials and monographs, the library processed over 2,200 interlibrary loans. About 130 in-depth, on-line computer searches were performed.

An automated on-line index to the central files was developed to provide wing staff with subject access to Centre records. The library also updated and published the 1983 edition of "Persons Involved in Environmental Research in Alberta". The mail room and the central filing system were also operated by this section.

Personnel Services — Recruitment was a major activity of this section as new staff members were hired and new programs were activated. There were 54 commencements and 13 terminations among salaried employees, for a net gain of 41. At fiscal year-end, there were 221 staff in various categories employed by the Centre. Among the new employees hired was an occupational health nurse who is attached to this section. The section was also active in offering training and educational programs to staff, including the regular orientation program for new employees.

Communications — An open house in September attracted some 500 visitors. A further 1,000 people were shown through the Centre in over 90 tours during the year. This section also recorded 44 media contacts and 129 printing orders, including several for the growing number of technical publications produced by the Centre. An annual review and regular staff newsletters were published and distributed.

PERSONNEL AND ORGANIZATION DEVELOPMENT

The Personnel and Organization Development Division provides the department with personnel, occupational health and safety and organization development services through a staff of 19. These include the personnel officer, nurse and support staff located at the Alberta Environmental Centre in Vegreville.

Co-ordinated by the director, the division has four branches — Administrative and Payroll Services, Personnel Services, Organization Development and Occupational Health and Safety.

Administrative and Payroll Services Branch

This branch provides administrative services to the division and is responsible for payroll functions for the department. As of March 31, 1983, the department had 1,258 salaried positions, with more than half located in Edmonton and the remainder in field offices throughout the province. Major field offices are located in Vegreville, Lethbridge, Calgary, Grande Prairie, Peace River and Red Deer.

During 1982-83, 156 salaried and 490 wage employees commenced with the department, 84 salaried and 341 wage employees terminated their employment and 116 were transferred to other departments in the provincial government.

Personnel Services Branch

This branch provides a broad range of personnel services including recruitment, classification, employee relations, organization analyses and employee counselling for the department.

Through recruitment, 174 competitions were held, a decrease of 7.4 per cent from the previous year's total of 236. This decrease was primarily attributed to lower turnover rates as well as department and government constraint measures. These measures included the department's executive committee review of all vacant positions and subsequent reallocation of a number of positions within the department and the elimination of 14 positions under the government restraint program. Advertising cutbacks were also introduced in August as a result of the lower vacancy rates and increased response to competitions. Competition responses increased to an average of 100 to 200 on junior technical positions, 50 to 100 on senior technical and trades positions and 100 on engineering positions. Even some positions requiring unique qualifications yielded from 30 to 50 responses. As a result, tighter screening criteria were used and resulted in better selection opportunities, primarily in the engineering classes.

A Recruitment Process Seminar was developed and delivered in the latter half of the year with favorable responses. An Interview Techniques Seminar is planned as a follow-up.

A number of organizational changes occurred in addition to the regular updating of position descriptions, resulting in 185 classification decisions on individual positions. Some organizational changes included the transfer of the departmental library to Finance and Administration Services from Environmental Protection Services and the municipal grant program for waste treatment facilities from Alberta Environment to Utilities and Telecommunications.

Additional services provided to staff, including employee relations, counselling, exit interviewing and organization review and analysis, continue to be important facets of the overall activities of the division.

Organization Development Branch

The branch operates as an integral part of the division, with specific responsibility for the human resource development programs designed to enhance the achievement of department goals.

During the year, there was a shift from a relatively mobile staff component to a more stable one. A consequence of this stability was a reduction in requests for orientation and remedial

training and an increase in requests for upgrading and developmental experiences. This stable condition also tends to place more stress on the appraisal systems; therefore, new guidelines to clarify the appraisal process and establish categories of performance were developed and implemented. The practice of conducting mid-probation appraisals, introduced in the previous year, is proving to be effective.

Participation in a broad range of internal and external developmental programs, particularly in courses of short duration, remained high. However, some reduction was noted in the latter part of the year. Educational leave activity was considerably less than in previous years. The selection of appropriate courses as well as the application of learning was reinforced through the introduction of a more practical learning contract procedure.

Programs developed and delivered internally included familiarization, stress management, appraisal processes and management development. A new seminar on the selection process was designed in collaboration with the personnel administrators and was offered to several managers. Other initiatives taken by the branch included arranging a practicum for a trainee from the Personnel Administration Office and participation in the University of Alberta's, Faculty of Engineering, co-operative education program. Several in-house seminars conducted by external consultants were arranged during the year.

The branch manager has been active on the Quality of Training Assurance Committee developing evaluation procedures to validate the quality of various programs. Instruments are being developed to measure course reaction, learning attained, behavior change and results to the organization.

Occupational Health and Safety Branch

The branch is responsible for co-ordinating the departments overall occupational health and safety program in addition to serving as its primary contact with Workers' Health, Safety and Compensation and the Workers' Compensation Board.

As always, considerable emphasis was placed on safety training and awareness programs. The departments Occupational Health and Safety Program is now the first item addressed in the new employee orientation program. In conjunction with orientation, first-aid training is made available to each new employee.

Throughout the year, concerns for safety were reflected in more and more appraisals, job descriptions, goals and objectives. As the department worked toward building safety into every job, the success of its efforts was evident in the fact that the accident frequency rate dropped for the third consecutive year and the department received one of the highest ratings in the over-all government evaluation program.

FIGURE I

POSITIONS BY CATEGORY

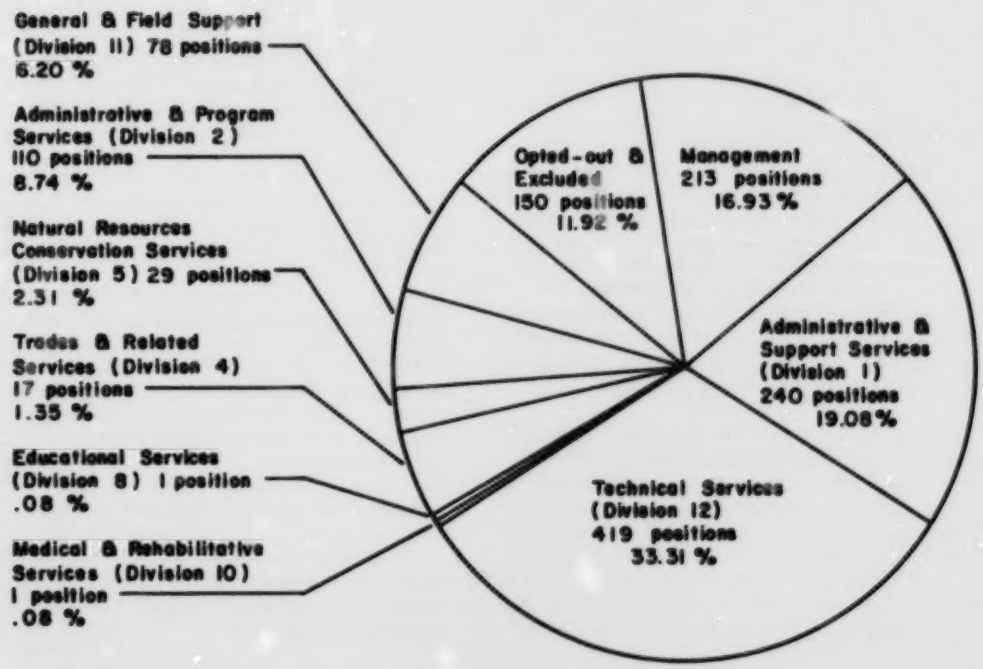

General & Field Support (Division 11) 78 positions 6.20 %
Administrative & Program Services (Division 2) 110 positions 8.74 %
Natural Resources Conservation Services (Division 5) 29 positions 2.31 %
Trades & Related Services (Division 4) 17 positions 1.35 %
Educational Services (Division 8) 1 position .08 %
Medical & Rehabilitative Services (Division 10) 1 position .08 %
Opted-out & Excluded 150 positions 11.92 %
Management 213 positions 16.93 %
Administrative & Support Services (Division 1) 240 positions 19.08 %
Technical Services (Division 12) 419 positions 33.31 %

FIGURE 2

EMPLOYEE LOCATIONS

LOCATION	No. OF EMPLOYEES
EDMONTON	764
VEGREVILLE	185
LETHBRIDGE	127
CALGARY	51
PEACE RIVER	24
GRANDE PRAIRIE	22
RED DEER	22
UNASSIGNED	18
SPRING COULEE	13
FORT MACLEOD	6
FORT CHIPEWYAN	5
TWO HILLS	4
FORT McMURRAY	3
ARROWWOOD	3
MEDICINE HAT	2
ST. PAUL	2
EDSON	2
CAMROSE	1
ENCHANT	1
HANNA	1
WAINWRIGHT	1
WHITECOURT	1
TOTAL	1258

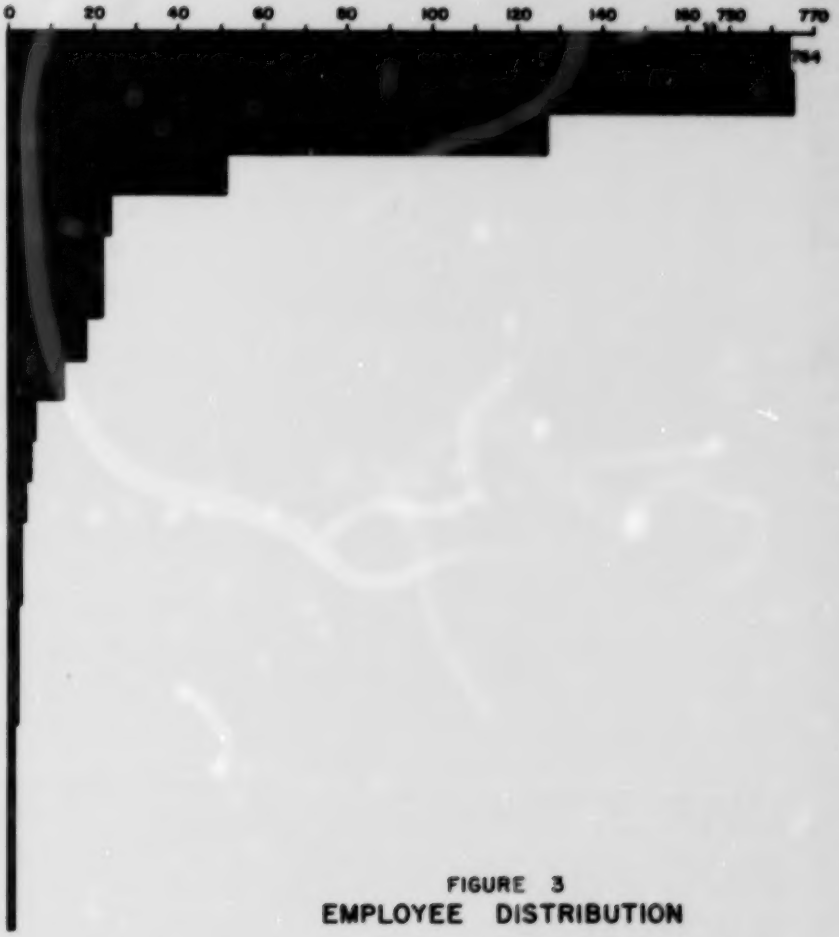


FIGURE 3

EMPLOYEE DISTRIBUTION

	No. OF EMPLOYEES	PER CENT
OFFICE OF THE MINISTER	4	.318
OFFICE OF THE DM AND ADMs/ SPECIAL PROJECTS / PER. ORG. AND DEV.	30	2.38
STANDARDS AND APPROVALS	30	2.38
RESEARCH MANAGEMENT	30	2.38
PLANNING	54	4.29
EARTH SCIENCES	79	6.28
FINANCE AND ADMINISTRATION	80	6.36
WATER RESOURCES ADMINISTRATION	104	8.27
OPERATION AND MAINTENANCE	114	9.06
TECHNICAL SERVICES	122	9.70
ENVIRONMENTAL CO-ORDINATION SERVICES	124	9.86
DESIGN AND CONSTRUCTION	140	11.13
POLLUTION CONTROL	143	11.37
ALBERTA ENVIRONMENTAL CENTRE	204	16.22

FINANCE AND ADMINISTRATION SERVICES

William Simon, RIA
Assistant Deputy Minister

J. A. Koler
Director
Financial Planning Division

E. A. Luczak
Director
Financial Operations Division

Dave Lougheed
Director
Systems and Computing Division

Jacquie Champion
Director
Public Communications Division

R. E. Bailey
Director
Contract Administration

M. Corbett
Director
Library Services

Finance and Administration Services are responsible for providing the department with a variety of administrative and support functions in six areas: Financial Planning, Financial Operations, Systems and Computing, Public Communications, Contract Administration and Library Services. These six major areas report directly to the Assistant Deputy Minister of Finance and Administration Services.

The Assistant Deputy Minister of Finance and Administration Services is the senior financial officer of the department and is responsible for implementing the provisions of the Financial Administration Act. He is responsible for the efficient operation of the Finance and Administration Services and for the department's overall financial and administrative management. This role is exercised through senior administrative personnel, who are functionally responsible to him, in the divisions. The senior financial officer's role also includes establishing an overall system of efficient internal control, developing a code of accounts which satisfies both central agency and departmental requirements, satisfying financial reporting needs of departmental personnel, and providing advice to financial expenditure officers with respect to the monitoring and controlling of their expenditures.

FINANCIAL PLANNING DIVISION

The Financial Planning Division is responsible for the co-ordination of budget process, space requirements, subsidized housing requirements, processing of insurance claims, acquisition proposal administration, records management and mail, courier and duplicating services.

Budget and Forecast Branch

The branch was responsible in 1982-83 for co-ordinating and compiling the 1983-84 Alberta Heritage Savings and Trust Fund Departmental Budget for $113,853,000 and the 1983-84 General Revenue Budget for $102,801,954.

The branch monitored the 1982-83 Departmental General Revenue and Alberta Heritage Savings and Trust Fund budgets along with co-ordinating and monitoring of the Summer Temporary Employment Program (STEP) and Priority Employment Program (PEP).

The branch also works with Public Works, Supply and Services, to provide departmental space needs and with the Risk Management and Insurance Division of Alberta Treasury in insurance matters.

Records Management Branch

The branch is responsible for the development and co-ordination of all aspects of a records management program. The staff provide an advisory service from Edmonton to the department as a whole.

In spite of the staff deficiency, some major accomplishments in the continuing development of a records management program were completed.

A records system conversion was designed and implemented in the Deputy Minister's office following the format of a block-numeric, subject file classification system. Systems were designed as well for five other organizational systems.

Three records management, in-house training courses were co-ordinated and delivered to support, managerial and technical staff in an attempt to familiarize the participants with specific elements of a records management program.

Consultation regarding equipment evaluation and micrographic systems was provided to five major department areas. Records disposition continued with the transfer of 6.5 cubic metres to basement storage, 2.1 cubic metres to the Alberta Records Centre and 4.1 cubic metres for destruction.

Office Support Services Branch

This branch provides the department with a wide variety of supportive services and office materials, including central duplicating services, courier and mail systems, building maintenance and security, telecommunications, furniture and duplicating associated equipment.

Services and equipment are provided to the department through a central office location in Edmonton and regional offices in Calgary and Lethbridge, with equipment being provided in Red Deer, Grande Prairie and Peace River.

The Office Support Services Branch is the department's point of liaison with Alberta Public Works for furniture acquisitions, telecommunications and physical building renovations throughout the province. The branch also works with Alberta Public Works in the areas of building maintenance and security, moving and replacing of furniture and requirements for electrical, carpentry and general labour services. The branch's courier services handles pickups and deliveries within the city and, when required, can be reached by mobile radio for emergency pickups.

More than 250 telecommunications and maintenance requests were processed for the department through Alberta Public Works, in addition to a large number of requests for new, additional and replacement furniture.

The branch has also acquired a number of pieces of new equipment for both central and regional offices to meet increased requirements for quality and service.

FINANCIAL OPERATIONS DIVISION

The Financial Operations Division is responsible for the development and administration of the central financial management systems and procedures for the department. This includes expenditure and revenue accounting, fixed asset control and providing financial consultancy and internal systems review services to senior management to assist in the attainment of their program objectives.

The division is organized into three branches, Accounting, Financial Advisory and Fixed Assets.

Accounting Branch

The Accounting Branch plans, develops, implements and maintains operational pro- cedures to ensure that accounting operations relating to accounts payable, revenue and receivables are in accordance with the requirements of the Financial Administration Act and applicable government policies and regulations.

Financial Advisory Branch

The Financial Advisory Branch conducts internal financial reviews and liaises with the Office of the Auditor General and Alberta Treasury to ensure that good internal control procedures are implemented in the department. The branch also provides assistance to other divisions for the improvement of their financial and administrative systems.

Fixed Assets Branch

The Fixed Assets Branch maintains a departmental fixed-asset control system with the primary objective to ensure protection of public property and that management achieves efficient utilization of fixed assets. A program of cyclical physical verification of departmental assets is in progress.

SYSTEMS AND COMPUTING DIVISION

The Systems and Computing Division supports all departmental programs in the planning, development, operation and maintenance of computer programs and systems to process a variety of data which the department requires to carry out its mandate. Computing facilities are also provided and departmental staff are trained to use the equipment and computer programs.

Consulting help and advice is provided to departmental staff when problems arise or changes are made to keep systems current and operational. The division also administers departmental data-processing activities and co-ordinates the department's data-processing activities with other government departments such as Alberta Public Works, Supply and Services and Alberta Treasury.

The division is divided into four branches — Systems Planning, Systems Development, Systems Operation and Office Automation. A small administrative section, attached to the director's office, provides general administrative services to these branches and co-ordinates administrative activities such as computer account registration for the whole department.

The Planning Branch is responsible for activities such as developing computer system plans, preparing the departmental Electronic Data Processing plans and conducting feasibility studies concerning computer systems.

The Development Branch is responsible for managing all phases of large and medium-scale computer systems development and enhancement projects, including developing detailed requirements, designing, programming and implementation. The branch primarily contracts for new systems development and manages consultants and acquires any necessary equipment.

The Operations Branch is responsible for ensuring all operational systems are kept current and operational. In addition, the branch develops small-scale projects as time permits. The branch also enhances and maintains all general-use equipment as needed. It also provides a consulting service to departmental members on operational problems.

The Office Automation Branch is responsible for overall development and implementation of computer-based systems used in office-oriented applications such as word processing, electronic mail and electronic filing systems. The branch also uses the services of the other branches in carrying out its activities.

Current Systems: Over 20 data systems and more than 40 scientific computer programs are maintained in support of 180 users in the department. Air quality, water quality, hydrometric, climatological and groundwater data systems are supported, which in turn support monitoring, assessment and regulatory activities of the department. Routine collection of data on water levels, precipitation and water quality by the department's mini-computer is also supported. A number of technical/engineering computer programs which simulate various hydraulic, hydrometric and atmospheric phenomena are maintained and used by department staff to delineate river floodplains, forecast river flows and predict pollutant concentrations.

Computer programs for statistical analyses, for preparing graphs and for tabulating data are maintained to help technical staff assemble reports.

Support for the preparation of textual material continued, as did training for 27 clerical staff members who use more than 25 word-processing work stations throughout the department. Other non-scientific systems include administrative systems such as the contract registry system, groundwater well system and water resource administration system.

Projects Completed: Some of the projects completed in 1982-83 included enhancing the efficiency of the groundwater well data, hydrometric data and seismic data monitoring systems. Other work completed included development of a graphics subsystem to support hydrological analysis, automating the reading of water elevation charts and installation of a graphics subsystem to support irrigation canal improvements.

Continuing Projects: Development of the environmental data acquisition system, water resource administration system and contract administration system will continue into 1984-85. The material testing laboratory system project, water quality model and water quality monitoring station replacement projects which were started last year also continued. The project to develop an office automation system for the department will also continue into 1984-85.

Co-ordination and Planning: Data and system technology transfers continued between the department and Environment Canada. These exchanges involved water quality, air-monitoring and hydrometric data. The department has access to Canada Land Inventory data, to indexes of available satellite and air photo imagery, to data about municipal water and wastewater treatment facilities and to information about special wastes. This information is available via computer terminals using federal agency systems.

The division continued to promote the use of system development standards and promote adoption of changes for more efficient economic development and use of computer systems.

PUBLIC COMMUNICATIONS DIVISION

The Public Communications Division provides media and production services, educational programs and communications counselling to the department.

Environment Views, a bimonthly magazine, continued to provide a forum for a multi-faceted examination of environmental issues in the province. Topics included: acid rain, urban air quality, design in the built environment, public lands, weather and climate (Parts I and II). The use of the magazines in schools was encouraged with the addition of an education page, relating articles to high-school social studies and science courses. Circulation is 12,000.

Communications counselling continued for the Special Wastes Program. New information materials were developed by a free-lance consultant.

An overall increase was again noted in news releases, media contacts and educational activities. Nearly 1,500 general enquiries and 3,000 education inquiries were processed. Innumerable media calls were handled during the Amoco sour gas well blowout near Lodgepole, in the fall.

A Calgary branch office was established by the Public Affairs Bureau to handle requests for increased communications services in Southern Alberta.

Environment Week involved co-ordination with a national planning committee and participation in the National Symposium on Water Resources. Special education kits were prepared by the education co-ordinator for Environment Week and were distributed to schools.

Environmental Education Resources Branch

The environmental education program operated by the Environmental Education Resources Branch continued to expand the scope and depth of its services to the educational community and the public. The branch assists such groups to develop a deeper understanding of the environment, their relation to it and the issues arising from man and environment interaction.

The environmental education program expanded this year beyond the awareness stage that has been stressed in past years. This was in response to an increased capability and need by Alberta Education for more extensive material and guidance. A process approach has been adopted, parallel to the approach used within the curricula of schools and teacher/outdoor-leader training facilities. This process, from awareness through stewardship-action, is a total program concept where issues and service areas addressed by the department are also responded to through educational material and program guidance.

Units that have been, or are being, developed include the Water Quality Monitoring Education Program (with the Water Quality Control Branch), aimed at Biology 20-30 classes, and the Waste Management Education Program (with the Waste Management Branch) for grades four-12.

Awareness level program materials and workshops were reduced in number and availability in response to an expressed need by the public for fewer materials at this level. In order to maintain service and yet reduce the overall focus of the branch on awareness programs, a network of workshop instructors was developed in co-operation with the Environmental and Outdoor Education Council of the Alberta Teachers' Association. From teacher applicants representing all regions of the province, 13 workshop instructors were contracted for workshop training.

An intradepartment committee was struck by the department's executive committee with membership including representatives of all service areas. Recommendations to the executive committee regarding program change and expansion were to be made by spring, 1983.

An interdepartment committee (Alberta Environment, Education, Recreation and Parks) was instituted at the direction of the three ministers involved. The head of the Environmental Education Resources Branch represents the department. The committee was

asked to report on the present status of environmental education in the province and make recommendations for its future development. This report is due in mid 1984.

In meeting the educational and training needs of educators and outdoor leaders in environmental education, the department has been involved in actively supporting advanced education programming in co-operation with universities, colleges, and Alberta Advanced Education. In March, 1983, the department sponsored a conference of 45 invited delegates from institutions of higher education, the general educational community, the interested public and government agencies to discuss credit programming at universities and colleges in environmental education. This conference was hosted by the University of Lethbridge.

Three pilot courses have been or will be offered with department sponsorship: one at the University of Alberta (Schools in Environmental Action, Ed. C. and I.445); the second at the University of Lethbridge (Environmental Education for the Eighties, Ed. 4946); and the third at the Blue Lake Centre (Nature As Classroom). In this way, institutions can obtain the support and expertise from Alberta Environment to develop courses in areas where they have little direct experience.

Production and Media Services Branch (Edmonton)

The Production and Media Services Branch (Edmonton) is responsible for assessing the communications needs of department programs and for planning and producing the necessary materials.

The two public affairs officers in this branch write, edit and co-ordinate the printing of brochures and other publications; arrange for the production of audio-visual aids such as posters, displays, signs and films; write and place advertising; and assist with special events. They also write and distribute news releases, respond to inquiries from the media and arrange press conferences.

During the reporting period, branch staff handled about 220 orders for print materials, audio-visuals and advertising. They prepared 124 news releases and received about 200 inquiries from the media. About 250 media inquiries were also made directly to department spokespersons.

Assistance was given to the following programs: the Eurasian Water Milfoil public awareness program; Lake Wabamun eutrophication study; used lubricating oil recycling; Dickson Dam; National Environment Week; vehicle exhaust testing; Paddle River dam; land reclamation; Cold Lake-Beaver River water management study; and special (hazardous) wastes and others.

Production and Media Services Branch (Vegreville)

The Production and Media Services branch continued providing communications services for the research, technical development and analytical and diagnostic programs of the Alberta Environmental Centre in Vegreville.

A major task was the production of an annual review outlining major programs and activities of the centre. As well, a regular staff newsletter was produced by the public affairs officer.

Emphasis continued on introducing the Centre and its work to local people. Some 500 attended an open house and another 892 were shown the centre in 92 tours. The centre continued its participation in the Vegreville Exhibition with an exhibit and parade float entry. Information on housing and community services was provided to new staff.

The branch processed 129 printing orders including publication of several technical reports on centre work. Some 44 media contacts were recorded by the branch and several press releases were issued to local newspapers.

Production and Media Services Branch (Calgary)

The Public Communications Division opened a Calgary office in July, 1982, to serve the communications needs of the regional offices in Southern Alberta.

One public affairs officer provides consultation services in communications as well as technical support in producing brochures, displays, reports and advertising. In addition, the public affairs officer co-ordinates media relations and assists with the promotion of special events.

The Calgary office was involved with several major programs in the course of the year, incuding the Blood Indian Irrigation Study, the South Saskatchewan River Basin Planning Program, the Little Bow River Basin Study and the Calgary Weir Safety Program.

CONTRACT ADMINISTRATION

Contract Administration personnel assist in the preparation of contracts proposed by the divisions, reviews and approves contracts originating in the department and processes for payment all accounts related to contracts.

The following is a summary of the volume and accumulative dollar value of contracts processed:

	Volume	Value
1977-78	624	$ 23.8 million
1978-79	1,000	$ 31.8 million
1979-80	928	$ 94 million
1980-81	932	$300 million
1981-82	1,092	$281.8 million
1982-83	1,175	$207.7 million

Of the 1,175 contracts processed in 1982-83, 24 were major tendered construction contracts amounting to a value of $55 million.

The above dollar values do not indicate the amount paid during the fiscal year since some contracts extended over a period of more than one year, and in other cases modifications introduced as work progressed may have reduced or increased the amount actually paid. This year, approximately 5,060 contract invoices were processed for payment for a dollar value of approximately $266,219,800.

The above figure includes payments on the water and sewage works assistance grants and the regional utilities program up to the time of transfer of the program to Alberta Utilities and Telecommunications in February, 1983.

The development of a new computer system to replace the existing one was initiated. This new system will enhance the efficiency of the Contracts Administration Division as well as provide department divisions with additional data and records for the financial management of contracts.

The refining and updating of standard contract documents continued, as did the entering of these documents into a word processing program.

Assistance was provided to divisions in the department in the development of a number of contracts or general agreements pertaining to water and sewage works assistance grants, the regional utilities program and the program for the rehabilitation or development of water supply works for irrigation districts.

Two seminars on contract administration were conducted for new accounting officers in the government and one was given to Alberta Social Services.

LIBRARY SERVICES

Library Services is responsible for collecting, housing and disseminating resources vital to the information needs of Alberta Environment staff. Private industry, members of the public and the university community also make use of its collection. Services provided include the ordering of all books, documents and periodicals for the department; the organization of these materials for maximum retrieval of information; the answering of reference queries; inter-library loan; and the enhancement and supervision of regional office library services.

Some organizational changes in the department during the 1982-83 fiscal year included the transfer of the Library to Finance and Administration Services from Environmental Protection Services.

During the year, over 2,500 items were added to the library's catalogued collection. Use of the collection continued to be high with 14,000 items circulated during the year. The collection is available to other government departments, public, university and private libraries through interlibrary loan. During the year, the library loaned out more than 1,500 items, while only 1,300 items were borrowed to supplement its information resources to meet staff needs.

Reference is a major service provided by the library. Staff answered more than 3,900 questions, including conducting 117 computerized literature searches. Three bibliographies on Alberta river basin systems were also compiled in response to staff needs for information on these topics.

Automation is playing a major role in helping the library make its resources more accessible to users. Computerized information retrieval services have been available for some years. Now the cataloguing system is in the process of being automated by the conversion of records from card format to machine readable and searchable form. More than 7,000 records have been entered into the library's automated catalogue. Conversion of all existing records is expected to be completed by March, 1984. This catalogue is known as the SCITECH data bank and has been developed in co-operation with the Alberta Agriculture and Alberta Research Council libraries.

ENVIRONMENTAL PROTECTION SERVICES

E. E. Kupchanko, P.Eng.
Assistant Deputy Minister

R. N. Briggs, P.Eng.
Director
Pollution Control Division

John Defir, P.Eng.
Director
Standards and Approvals Division

L. D. Sadler, P.Ag., P.Eng.
Director
Earth Sciences Division

H. P. Sims, Ph.D.
Director
Research Management Division

The role of the service is to prevent or control pollution, and to encourage research into applied solutions for environmental problems.

A major part of the program involves the setting of standards which govern the maximum amount of contamination permitted to enter the environment from most man-made sources.

Another key part of the program is the monitoring of the environment — principally the air, water, wastes, and pesticides — to ensure the standards are being followed and, where necessary, to enforce compliance with the standards for control of pesticide chemicals and solid (municipal and industrial) waste disposal.

The research activities focus on finding solutions which are directly applicable to a wide range of environmental problems, including those related to human interactions as well as to man's impact on the natural biological and physical systems.

The service administers grants to assist communities in developing adequate water supplies and sewage treatment facilities.

POLLUTION CONTROL DIVISION

The Pollution Control Division enforces various legislation — the Clean Water Act, the Clean Air Act, the Agricultural Chemicals Act, the Hazardous Chemicals Act, the Litter Act, the Beverage Container Act and their respective regulations — to achieve safe and publicly acceptable levels of environmental quality.

Air Quality Control Branch

The purpose of the Air Quality Control Branch is to achieve air quality within established standards.

The branch enforces the regulations under the Clean Air Act, the terms and conditions of air quality licences and approvals and is responsible for the general monitoring of the air environment. It maintains an extensive air quality monitoring network and has an intensive program for sampling effluents from stationary sources. Industry is required to monitor its operations, and the branch reviews and verifies these results.

Five air quality directives and three emission control orders were issued for violations of the Clean Air Act, and three offenders of the act were prosecuted.

In 1982, the branch continued to receive and investigate complaints as follows:

Table 2

Number of Complaints Handled in 1982

Type	Edm. Urban Area	Clg. Urban Area	North. Rural Area	South. Rural Area	Total
Odor	166	60	49	58	333
Dust	31	22	18	21	92
Smoke	25	21	11	13	70
Noise	10	1	11	0	22
Misc.	8	7	6	4	25
SUB TOTAL	240	111	95	96	542
Percent Resolved*	38.8	56.8	38.9	35.4	41.9
Amoco Lodgepole Wild Well	1,156	23	227	32	1,438
TOTAL	1,396	134	322	128	1,980

*NOTE: The remainder of complaints are either pending, were not able to be verified or were referred to the appropriate authority or agency.

The number of complaints received by the branch in 1982 represents an increase of 205 per cent from 1981 (including the Lodgepole wild well calls).

Urban Air Quality Monitoring: The air monitoring network for Edmonton and Calgary consists of 56 total sulphation stations, 61 dustfall stations, five hydrogen sulphide stations, four fluoride stations, six soiling index analyzers and six high-volume samplers.

A total of nine comprehensive and continuous air monitoring stations were operational. Each of these stations had instrumentation for the detection of carbon monoxide, ozone, oxides of nitrogen, nitrogen dioxide, sulphur dioxide and total hydrocarbons. Four of these stations are based in Edmonton, four in Calgary and one station is used for monitoring the other major urban areas. An air quality index (IQUA) based on the most significant air pollutants (nitrogen dioxide, carbon monoxide, ozone, sulphur dioxide and smoke) in Edmonton and Calgary was released daily to the media and general public.

The monitoring network for smaller urban centres consists of eight high-volume samplers, 27 total sulphation, 25 hydrogen sulphide and 19 total dustfall exposure cylinder stations. A comprehensive survey was carried out in Medicine Hat and Ft. Saskatchewan.

Rural Industrial Air Quality Monitoring: The branch operated four mobile laboratories in the Red Deer, Whitecourt, Calgary and Edmonton areas. The laboratories continuously monitor sulphur dioxide, hydrogen sulphide and wind speed and direction. Special air quality monitoring surveys were conducted in the Sundre, Kananaskis (Moose Mountain), Mildred Lake, Fort McMurray (Thickwood district) and Green Court areas.

A network of 30 total dustfall, 184 hydrogen sulphide, 194 total sulphation and 14 fluoride exposure cylinder stations are maintained near rural industrial operations.

Monthly precipitation samples related to the assessment of acid rain impact in Alberta were collected and analysed at six locations: Suffield, Calgary, Red Deer, Edmonton, Whitecourt and Beaverlodge.

Industry Compliance Review: The branch received monthly and annual reports from major industries such as fertilizer, petroleum, gas processing, pulp and paper, meat packing, thermal power, steel, rendering, chemicals, plastics, cement and wood products. These reports were checked for compliance with licence and approval requirements and the branch investigated cases of non-compliance. The amount of data handled is summarized as follows:

Table 3

Reports Reviewed Per Year as Required by Clean Air Licences

	1978	1979	1980	1981	1982
Monthly reports required to be submitted as per licence	2,612	2,832	3,043	3,182	3,262
Annual reports required to be submitted as per licence	222	231	246	276	266

Air Pollution Source Monitoring: In 1982, 150 sampling tests were conducted on 40 stacks at 16 plants, to assess the air contaminant emission rates from stationary sources and to check compliance with approved limits. A gas chromatograph for on-site source sampling was used to measure vinyl chloride monomer and total reduced sulphur compounds.

Source emission surveys conducted by various industries were reviewed for com pliance limits and for acceptability of sampling technique. In addition, approximately 40 source emission surveys, conducted by industry or consultants, were witnessed.

Meteorology: The Edmonton air pollution meteorological station (rural) continued to gather wind, temperature stratification and turbulence data. Four minisondes were released each weekday during the midseason months to determine complete boundary layer profiles of wind and temperature. Inversion heights were monitored continuously with a SODAR (sound detection and ranging) unit.

During 1982, a doppler acoustic radar went into operation. It measures the three components of wind and turbulence up to an altitude of 500 metres.

Other Activities: For the period of October 17, 1982, to December 23, 1982, a sour gas well located near Lodgepole, Alberta, flowed out of control. The branch resources during this time period were devoted primarily to monitoring ambient air pollutant levels of hydrogen sulphide and, when the well was on fire, sulphur dioxide levels.

Alberta Environment and the industrial members of the Alberta Petroleum Industry/Government Environmental Committee (APIGEC) signed an agreement to fund and direct a seven-year research program on the environmental effects of acid forming gases produced in Alberta.

The branch is continuing support of a dry sulphur deposition measurement project. The three-year project, in its final year, is carrying out field studies related to sulphur dioxide concentration gradients and the test of eddy accumulation methods.

A Scientific Methodology Assessment Committee was established to review and comment on the results of the trace atmospheric contaminant monitoring which was conducted for the branch by Sciex Inc. and the University of Calgary in 1981.

The compressor station chemistry model was completed and used to predict ground level concentrations of nitric oxide and nitrogen dioxide for typical operating and atmospheric conditions. A major study of gas diffusion in two mountain valleys was undertaken using a numerical model and an intensive month long field measurement program.

A joint Alberta Environment - Environment Canada voluntary exhaust testing centre was operated for one week each in Edmonton and Calgary in the fall of 1982.

Water Quality Control Branch

The main functions of the Water Control Branch are to enforce the Clean Water Act, regulations and licence conditions dealing with the industrial wastewater effluents and to maintain an acceptable level of surface water quality through the province.

Activities in 1982-83 included:

1. Industrial Inspections: All licenced industries with wastewater discharge were inspected on numerous occasions during the year. These inspections included assessment of the wastewater treatment facilities and assessment of wastewater quality to determine compliance with licence requirements. Monthly and annual reports received from industry as a condition of licence requirements were also scrutinized for compliance.

2. Stream Monitoring: Stream monitoring, which consists of routine manual sampling and testing of major rivers in Alberta, robot continuous monitoring and biological assessment, continued through the year.

In 1982, the branch embarked on an intensive study of the North Saskatchewan River, the purpose of which was to determine the impact of industrial and municipal discharges into the river. When completed, the study will also provide a better understanding of in-stream processes so that a more accurate prediction of water quality can be made for planning purposes. These intensive studies will be done on a rotational basis covering all the major streams in Alberta.

Work on the Bow River continued in 1982-83 as part of the South Saskatchewan River Basin Planning Program. Considerable resources were dedicated to water quality model selection and application in order to predict water quality in the South Saskatchewan River under different water use management options. This work was also designed to establish water quality trends in the Bow River as a result of phosphorus removal operations at the Calgary sewage treatment plants.

3. Special Projects: Three special projects were initiated in 1982-83 as a result of environmental emergencies. These are:

Well Blowout - Lodgepole: During the Lodgepole well blowout incident, the Water Quality Control Branch investigated and monitored surface water quality in the affected area. The branch role was to mitigate the impact of the blowout well on surface water and groundwater.

Twin Butte: The branch was actively involved in monitoring surface waters in the Twin Butte area. This work was initiated to determine if the contamination at the Pincher Creek Gas Processing Plant had migrated beyond the plant site and affected surface water quality.

Oil Sands: As a result of the operation emergencies experienced at the Suncor plant, the branch became inolved in assessing the impact of the resulting oil spill on the Athabasca River.

The branch was also involved in enforcement activities, including giving evidence and appearing as expert witness at the trial.

4. Enforcement: As a matter of course, the branch meets with industrial representatives on a routine basis to discuss past performance and future plans for the plants. Resolutions of problems are also discussed and, where these problems persist, directives or orders are subsequently issued. During the year, two directives and four Water Quality Control Orders were issued.

Municipal Engineering Branch

The branch's primary responsibilities are to enforce the Clean Water Act and regulations with regard to municipal water and sewage systems and to implement the Regional Utilities Program. Other branch activities include monitoring municipal water and sewage systems, investigating complaints, implementing projects of interest to the province, and training and educating municipal water and sewage operators. The branch is divided into three sections:

Field Services Section: This section is responsible for routine monitoring, surveillance and enforcement activities of the branch. These activities are provided through the main office in Edmonton and the regional offices at Grande Prairie, Lethbridge and Red Deer. Table 3 indicates the general level of activity for this section in comparison to previous years.

Table 4

Field Services Section
Activity Comparison

	1980-81	1981-82	1982-83
Inspections	850	650	900
Problem Investigations	12	40	57
Composite Sampling	32	53	44
Communities Inspected	360	310	320
Private Facilities Inspected	92	50	60

The field program returned to normal with the field start-up of the chemistry services of Alberta Environmental Centre. Major field monitoring activities include:

(1) continuance of the treated water survey with addition of other centres;
(2) continuance of split sampling of sewage samples at Edmonton, Calgary, Red Deer and Lethbridge;
(3) continuation of screening potable water in several communities using biological/chemical techniques;
(4) additional ion exchange pilot work at Mirror and Forestburg;
(5) sanitary surveys of about 20 hamlets in the east central portion of Alberta in conjunction with the local health units;
(6) dye studies to determine the effective residence time in several lagoon systems;
(7) initiating studies and undertaking screening for giardiasis ("beaver fever"), especially in the Edmonton area;
(8) evaluation of aeration design associated with aerated digestor facilities in several communities within the province; and,
(9) follow-up and action relative to the illness outbreak at Drumheller during late February, 1983.

In addition to the above activities, the section produced a variety of annual surveys of facilities, fluoridation, water quality and bacteriological quality. The computer data system was maintained and upgraded with work on a new print format.

The section was involved with a number of emergency situations. These activities ranged from working on planning committees to properly co-ordinating overall department response in emergency situations to actually dealing with specific emergencies. Of particular note was the section response in July, 1982, when the Grande Prairie water treatment plant was flooded and inoperative for almost two weeks. Other situations included bacterial and water quality problems at Redcliff and St. Paul, problems associated with the start-up of the Vegreville regional water supply line, and the illness outbreak at Drumheller.

Extensive activity with the Northern Water Supply Program continued. The plants were upgraded and repaired as required. The successfully completed negotiations resulted in the transfer of the systems in Little Buffalo, Gift Lake, Calling Lake and Wabasca to Municipal Affairs. The Loon Lake and Paddle Prairie plants will be transferred within the next two years.

Regional Utilities Section: The section is responsible for evaluation and implementation of the Regional Water and Sewage Program and include the Edmonton, Calgary, Cold Lake - Grand Centre, Crowsnest Pass and Red Deer areas.

Work continues on the Edmonton Regional Sewage system. On the Southeast Region Sewage system land aquisition, design and construction are proceeding simultaneously on the project with Stage I, Stage II, Stage III south and the river crossing completed.

Construction commenced on Phase I of the Parkland Sewage Line (Stony Plain to Spruce Grove). Detailed design and land acquisition was 50 per cent complete on the lift station and on Phase II (Spruce Grove to the lift station).

Preliminary design and land acquisition was initiated on the North East Regional Transmission System.

The regional sewage treatment plant was approximately 40 per cent complete.

The Vegreville Corridor waterline was completed as commissioned.

In the Calgary area, discussions were held with local officials concerning implementation of the Calgary Regional Utility Study recommendations.

The department completed a water and sewage study for the Crowsnest Pass area.

The evaluations of the Bow River Corridor regional water and sewage study were completed.

A formal agreement for a regional sewer system was executed between the province, the Town of Penhold and the County of Red Deer. Funding was provided toward the construction of the Waskasoo Regional Sewage System.

Further funding was provided for the Cold Lake - Grand Centre, Morinville and Airdrie water lines and the Airdrie sewage line.

Total Regional Water and Sewage Program expenditures to year ending March 31, 1983, were $45,274,465.

Financial responsibility for the Regional Water and Sewage Program was transferred to the Department of Utilities and Telecommunications.

Operator Training and Certification Section: The section is responsible for the development and delivery of operator training and certification programs.

A municipal water and wastewater operator training program was continued during the year. The object of the program is to provide training for the operators of water and wastewater treat-

ment plants. A total of 11 short courses and two correspondence courses were offered by the branch. Approximately 320 municipal operators from rural municipalities, villages, towns and cities took part in the program.

Assistance was provided to Western Technical Institute for the development of a course for water and wastewater operators. This course has been given approval and should be operational within a year.

Also, assistance with courses and training material was given to other organizations such as the Western Canada Water and Sewage Conference and the Federation of Associations on the Canadian Environment.

The mandatory certification program for municipal operators commenced during the year. Guidelines for the program were prepared and approved. A total of 420 operators now hold certificates under the program. Of these, 97 restricted (no examination) certificates were issued during the year. The first certification exams were administered this year. Forty-eight operators wrote and passed the examinations. They now hold unrestricted or universal certificates.

Pesticide Chemicals Branch

The branch has responsibilities in three broad areas:

— Licencing, training and enforcement: administration of the Agricultural Chemicals Act and the co-ordination and development of pesticide management-training programs;
— Aquatic-terrestrial surveillance: aquatic and industrial vegetation management programs are monitored to determine the impact of control activities; and
— Biting fly abatement: administration, co-ordination and supervision of the Municipal Biting Fly Control Financial Assistance Program.

Licencing, Training and Enforcement: The branch licenced 620 pesticide applicators and 170 pesticide dealers. Four inspectors were appointed under the Agricultural Chemicals Act. Two hundred and twenty special permits were issued for the application of restricted or experimental pesticides. Many of these permits covered the use of pesticides in water bodies and in the forested areas of the province.

One hundred and forty complaints involving pesticides were investigated.

Pesticide training courses were held at Lethbridge, Calgary, Olds and Edmonton with a total attendance of 507 people. Correspondence courses in pesticides were completed by 46 persons.

During the year, 2000 pesticide vendor outlets were visited and inspected. Separate inventories of the larger storage facilities were maintained in the event of fires or emergencies. Forty-nine test wells were installed to monitor possible leaching from pesticide container collection sites. Several sites of major fires, spills and accidents were monitored for pesticide residues.

Aquatic-Terrestrial Surveillance: A combined total of 118 permits were issued for pesticide application on, in or near water and on industrial rights-of-way in Green Area. A more extensive monitoring program was initiated to inspect application sites prior to, during and after the pesticides were applied in this area.

Two aquatic weed surveys were conducted: one, to determine the diversity and abundance of aquatic weeds in irrigation canals; two, a survey of 34 high priority lakes and reservoirs to see if the aquatic weed Eurasian Water Milfoil was present. This weed was not found in any water body.

A public awareness program made Albertans aware of the aquatic weed Eurasian Water Milfoil. Highway signs, radio ads, public displays, posters, brochures, bumper stickers and lectures were all used to acquaint Albertans with the weed and the problems associated with it.

Two studies were initiated by the branch: one, a contract was awarded to determine improved methods of vegetation management in the Green Area; two, a study was started to evaluate and determine the effectiveness of Aquascreen and Window screen in suppressing the growth of submerged aquatic weeds in lakes.

Biting Fly Abatement: Department grants totalling $663,666 were provided to 34 municipalities which participated in the 1982 Biting Fly Control Financial Assistance Program. Due to severe mosquito outbreaks throughout the province, control program costs were unusually high during 1982.

Contracts in the amount of $83,562 were processed by this section. Continued support was provided for studies related to biting fly biology and abatement methodologies.

Branch personnel carried out 126 routine monitoring and inspection checks of biting fly control programs during 1982. As well, several complaints related to biting fly problems and pesticide applications were investigated. Information and technical assistance was provided to abatement programs and the general public by means of media contact, personal visits, bulletins, seminars and training courses on safety, management and control of pesticide chemicals and the biology of mosquitoes.

Four ongoing studies were conducted by branch staff: the potential for biological control of mosquitoes using parasites and predators native to Alberta was assessed in one study; the second determined factors contributing to the production and control of large mosquito populations in conjunction with irrigations; the third study screened larvicides for the pretreatment of mosquito developmental sites; and the fourth entailed the monitoring of the Athabasca River to determine the impact of methoxychlor on non-target organisms. Such studies and continuous monitoring are essential to ensure that more environmentally acceptable measures are being implemented wherever possible in abatement programs.

Special Programs: Twenty-seven permanent pesticide container collection sites were added during the year by rural municipalities with the department providing $89,751 as financial assistance. Over 400,000 pesticide containers were collected, the majority of which were recycled at steel mills in Calgary and Edmonton.

Publications: The monthly publication, Update, was mailed to 1800 subscribers, and a fact sheet entitled "First Aid for Pesticide Poisoning" was published and distributed.

Branch personnel provided representation on provincial, federal and interdepartmental committees dealing with the use and disposal of chemical compounds, research priorities, and the environmental impact of abatement programs.

Waste Management Branch

The Waste Management Branch is involved in the management of industrial and hazardous wastes and the reduction of waste through resource recovery. The branch administers the Hazardous Chemicals Act, the Beverage Container Act and the Litter Act.

Hazardous Waste Management: Hazardous waste generation and disposal continues to be a major environmental problem in Alberta. The development of a policy and action strategy advanced in 1982-83. Siting of a centralized treatment facility received considerable attention, resulting in several communities holding plebiscites on the issue. Legislation on hazardous waste management and for the establishment of a Crown Agency on hazardous waste was given third reading in the spring session of the legislature.

The branch continues to provide technical and financial assistance to municipalities for advanced waste management and facilities. In 1982-83, grants were given to: the Wainwright Regional Incineration Authority (Municipal District of Wainwright, Town of Wainwright, Town of Irma and Town of Edgerton) — $1,324,865; Foothills Waste Management Authority (Municipal District of Foothills, Town of Okotoks and Town of High River) — $226,338

(final payment); Lacombe Regional Solid Waste Management Authority (County of Lacombe and Town of Lacombe) — $700,000 (final payment); Camrose Regional Solid Waste Management Authority (County of Camrose, City of Camrose and Village of Bittern Lake) — $544,197; and, Canmore — $154,600. As a result of the program more than 20 open burning dumps were closed.

The branch also provides information and advice on the safe handling and disposal of hazardous wastes and ensures proper containment and clean-up of chemical spills. Advice is given on the restoration of affected sites.

Resource Recovery: The branch encourages and promotes recycling of waste materials by providing information and technology to industry, municipalities and the public. A grant program is available to non-profit groups and municipalities for recycling equipment, such as containers for glass or paper and used-oil collection tanks.

A major aspect of resource recovery is the administration of the Beverage Container Act and the Alberta container depot system. In 1982-83, 205 licensed depots were operating in Alberta for the return of soft drink bottles and cans, liquor and wine bottles and juice cans. Glass, metal and plastic containers returned to depots are recycled into other products.

Used-oil recycling advanced in 1982-83 with the installation of two collection tanks, one at the transfer station in Three Hills and the other at the public works yard in Rimbey.

Litter Control: The branch is responsible for the administration and enforcement of the Litter Act. This act allows police and local enforcement officers to issue tickets for littering offences and clean-up orders for unsightly premises. The branch also works with and financially supports Outdoors Unlittered Inc., a non-profit organization engaged in anti-litter campaigns and educational programs.

STANDARDS AND APPROVALS DIVISION

The Standards and Approvals Division processes applications submitted by both municipalities and industries which must apply for permits to construct and licences to operate their facilities under the Clean Air Act and the Clean Water Act. The approval criteria reflect current environmental control technologies designed to minimize air, water and land pollution. Additional responsibilities of the division are the review of relevant legislation for potential amendments and the development of the various emissions and effluent guidelines for municipal and industrial operations.

Air Quality Branch

The prime responsibility and objectives of the Air Quality Branch are to achieve and maintain acceptable ambient air quality through the use of regulations, guidelines and policies applied to industrial and other operations.

A considerable amount of time continued to be spent in assessing air quality impact from new industrial developments and on expansion phases of existing facilities in order to ensure that acceptable air pollution control systems were being applied and used.

A total of 172 permits and 417 licences were issued under The Clean Air Act during the year (see Table 5) as well as two Certificates of Variance.

Table 5

Air Quality Permits and Licences 1982-83

Category	Permits	Licences
Agricultural Activities Including Meat-Processing Plants	9	35
Anhydrous Ammonia Storage Facilities	5	9
Asphalt Plants	0	19
Chemical Plants	6	4
Compressor Stations	40	63
Experimental In-situ Oil Sands Operations	11	8
Fertilizer Plants	1	3
Gas-Processing Plants	72	158
Incinerators	9	53
Oil Refinery Operations	3	10
Power Plants	6	2
Others	10	53
Total:	172	417

Staff continued to participate extensively in Energy Resources Conservation Board hearings. In addition, the branch was active on several committees dealing with acid rain. The branch continued its participation on the National Air Quality Objectives Sub-Committee, contributing to the development of ambient air quality objectives.

The Air Quality Branch drafted guidelines for the thermal electric coal-burning power plants and waste-refuse incinerators. These guidelines are presently under review by all interested parties.

Some de-regulation was initiated by eliminating the restricted burning areas surrounding Calgary and Edmonton and the associated approval requirements for open burning of burnable debris. Now, the only approval required is from the local fire-control authority. The approval requirements for the establishment of anhydrous ammonia storage facilities was also eliminated.

Water Quality Branch

Forestry, coal-mining and gas- processing projects were the major industrial sectors requiring water-quality impact assessments by branch staff. In order to provide a standard methodology of

impact assessment, a procedures manual for evaluating water quality changes in receiving streams was commissioned. In view of the maximum five-year cycle of licence renewals for existing industries, a description of the most applicable methods would assist industrial proponents in the identification and prediction of quantitative changes that result from a single-point, steady-state discharge of an industrial effluent to a watercourse. Color reduction technology and the impact of taste and odor micro-constituents originating from the operation of existing and new market Kraft bleach pulping mill operations continued to focus a great deal of attention.

The branch continued to supply water quality information, particularly with respect to Cold Lake developments, and to examine technical documentation provided for hearings and public meetings conducted by the Energy Resources Conservation Board and the Alberta Energy and Natural Resources Department.

A total of 124 permits and 233 licences were issued for the construction and operation of industrial facilities (see Table 6). Seventeen letters of permission were also issued, authorizing the temporary release of liquid effluents under controlled conditions. Nineteen projects were exempted from having to obtain environmental water permits and licences.

Table 6

Water Quality Permits and Licences (1982-83)

Category	Permits	Licences
Asphalt Plants	0	16
Chemical Plants	8	4
Coal Processing	5	0
Concrete and Cement	1	1
Fertilizer	1	1
Fiberglass	0	1
Food Processors	0	2
Gas Plants	67	157
Meat Packing and Processing Plants	0	1
Oil Sands Plants	21	19
Petroleum Refineries	0	3
Power Plants	5	3
Pulp Mills	0	0
Salt Caverns	1	1
Sand and Gravel Washing Plants	9	19
Snow Disposal Sites	0	0
Tar Sands	0	0
Wood Processing	2	1
Miscellaneous	4	4
Total:	124	233

Seventy-five new applications for certificates of compliance were received for large livestock operations in the southern part of the province. Twenty-eight certificates were issued from these applications. Fifteen certificates were issued from 23 applications received in the northern region. Assistance was provided in the initiation of a microbiological research study conducted by the Alberta Environmental Centre, relating to feedlot operations.

Municipal Engineering Branch

The major objective of the Municipal Engineering Branch is to ensure that municipalities have water and sewage facilities which provide a high level of public health and environmental protection.

To achieve this objective the branch is responsible for:

— the updating and development of standards for municipal water supply, sewage and storm-water systems;
— the review and approval of engineering reports, plans and specifications for all municipal water supply, sewage and storm-water systems in the province;
— the issuance of specific operating conditions and requirements for both water-treatment and sewage-treatment plants; and
— the administration of the Alberta Municipal Grant Program which provides financial assistance to municipalities upgrading or expanding water- and/or sewage-treatment facilities.

Review, approval-and licensing of all municipal water and sewage projects continued to be the major activity of the branch. During 1982-83:

— a total of 314 permits to construct water and sewage projects were issued;
— 107 certificates of compliance relating to the satisfactory completion of outstanding conditions remaining on previously issued permits were issued;
— 18 licences to operate detailing operating parameters and reporting requirements for water and sewage treatment facilities were processed; and
— 10 letters of permission authorizing land application of sewage sludge were issued.

The decrease in the number of permits issued during the year, as compared to previous years, can be attributed primarily to the continued downturn in the number of subdivision projects.

During 1982-83, standards reviews and revisions were undertaken as necessary with emphasis on:

— land application of sewage sludges;
— policies and practices related to the disinfection of treated sewage discharges;
— water and sewage piping materials and specifications;
— design requirements for aerated lagoon-sewage treatment systems;
— preparation of a design manual for sewage lagoon liners; and
— review of the branch's publication "Recommended Standards for Water Supply and Sewerage".

The management of the Alberta Water Supply and Sewage Treatment Grant Program continued to be a major and high-profile activity of the branch. The total budget allocation for the program was $103,807,000 and funds in the amount of $101,316,773 were disbursed to fulfil prior commitments as well as to initiate 59 water and sewage projects in 56 municipalities. To ensure uniform and equitable application of financial assistance under this grant program, a Policy and Procedures Manual was developed. In February, 1983, responsibility for the administration of the grant program was transferred to Alberta Utilities and Telecommunications.

As in past years, branch staff spent a large amount of time assisting municipalities and their engineering consultants with the planning, selection and design of water-supply and sewage systems.

Industrial Wastes Branch

Branch staff responsibilities included: routine review of applications for industrial waste disposal to land, including land filling, land farming and deep well; review of applications for approval of in-situ heavy-oil experimental schemes; inspection of relevant plants on behalf of the Atomic Energy Control Board; participation on the Federal-Provincial Consultative Committee on Low-Level Radioactive Waste Management; training of visible emission readers; preparation of guidelines outlining requirements for hazardous waste storage, incineration and land-fill disposal; and supply to the general public upon request disposal methods for industrial wastes.

EARTH SCIENCES DIVISION

The Earth Sciences Division plays a distinct role in the department by applying the expertise of a diverse technical group to problem solving, inventory and applied research in soil and groundwater protection, waste disposal and groundwater development.

In 1982-83, division activities and programs responded to needs ranging from individual complex problems of hazardous chemical contamination to requests for resource data. Investigations for waste disposal cover a broad spectrum from macro scale municipal effluent irrigation to small, site specific solid waste disposal facilities.

Technological applications to enhance projects and activities were emphasized. Seismicity work related to Cold Lake resource development and monitoring of Turtle Mountain in the Crowsnest Pass as well as computer modeling with predictive ability are examples.

Further consolidation of public services in the government was achieved with the transfer of two groundwater observation well networks (Oil Sands and Provincial) and the groundwater resource data files from the Alberta Research Council. Upgrading of the well networks and file accessibility was initiated immediately after the transfer.

Two additional long-term (50 years), acid-soil monitoring sites were established near Pincher Creek and Cold Lake. Sampling is scheduled every four years.

Increasing emphasis was placed on, first, delineating groundwater aquifers of northern Alberta and, second, the impact of industrial activity on soil and groundwater quality. As well, deep-well injection of wastes was closely scrutinized.

The division continued to emphasize one-on-one contact with the public through several established programs and extension activities.

Hydrogeology Branch

The Hydrogeology Branch underwent major reorganization with two programs being transferred from the Alberta Research Council to the branch and a change in name from Groundwater Branch to Hydrogeology Branch. Five sections responsible for exploration and inventory, geology, groundwater information, groundwater technology and engineering were established.

The Exploration and Inventory Section is responsible for major regional drilling, geologic mapping and geophysical programs within Alberta Environment.

The Geology Section is responsible for the review of all oil and coal-mining activities which may impact groundwater and represents the department on the Water Well Recovery Program and the Development and Reclamation Review Committee. The section also undertakes general groundwater studies such as the recently completed South Saskatchewan River Basin report.

The responsibilities of the Groundwater Information Section include the operation of the Groundwater Resources Information Service and inspections under the Ground Water Development Act. A major emphasis during the past year was the transfer, from the Research Council, of over 200,000 files of information on groundwater, geology and water chemistry. The files are organized by land location with an index of information available in microfiche format. The files were microfilmed during the winter of 1982, with final editing to be completed by the fall of 1983. This project will enable regional offices of Alberta Environment and Agriculture as well as consulting firms to have relevant information readily available for day-to-day use.

The Groundwater Technology Section has had major success with the development and operation of groundwater models related to contamination and basin-water management. A research project examining the relationship of pollution source to groundwater movement, through the analysis of sulphur isotope ratios, is being conducted in co-operation with the University of Calgary.

The Engineering Section is responsible for support to the other sections, in test-hole drilling and water-well construction and for the operation of three observation well networks.

Observation Well Networks: Observation well networks are established to determine how aquifers respond over time to natural events such as precipitation, evaporation, groundwater recharge, change in river and lake levels and man-made events such as groundwater withdrawals, industrial activity and reservoir level fluctuations. Knowledge of how water levels fluctuate in response to these influences assists in the allocation of groundwater, the protection of the resource from contamination and the design of large dewatering and wastewater injection projects.

The Oil Sands Network consists of 91 wells on 26 individual sites within 100 kilometres of Ft. McMurray. These wells range in depth from 10 to 580 metres with water levels ranging from ground surface to 384 metres below ground surface. All major formations above and immediately below the oil sands are monitored either automatically or manually.

The Provincial Observation Well Network, consisting of over 40 wells equipped with automatic recorders, monitors water levels in fresh water aquifers ranging in depth from eight to 160 metres. Twenty to 30 new wells will be constructed each year until approximately 150 wells are in the network.

The third network consists of wells installed for specific projects such as research basins, the monitoring of reservoirs and the monitoring of industrial and municipal withdrawals. Wells have recently been installed in the vicinity of the Dickson and Paddle River Dams, in the town of Peace River and in the Buffalo Lake area.

Groundwater Model Application: This program uses mathematical models to assist in solving hydrogeologic problems involving groundwater flow and mass and energy transport in the subsurface. Computer models for groundwater resource evaluation and contaminant transport analysis have been acquired.

A study was conducted with a finite element aquifer flow model for the Cold Lake-Beaver River Basin to evaluate the hydrologic impact on the aquifer system due to groundwater withdrawals by potential industrial and municipal users in the basin. A feasible groundwater management scheme was developed to serve as a basis for river-basin planners to formulate water resource allocation plans to meet future demands in the basin. From this modeling study, areas of data deficiency were identified and efforts are underway to rectify the data gap. The model will be constantly updated and will serve as a tool to analyse various groundwater management alternatives.

Hydrogeological Inventory in the Cold Lake area: Investigations into the origin of preglacial channels in the vicinity of Bonnyville, Grand Centre and the Cold Lake air-weapons range led to outlining the history of a preglacial drainage system in the Western Canadian Sedimentary Basin. A paper was presented to the Geological Society of Canada which, while a departure from standard interpretation, received gratifying professional recognition. Office, geophysical and drilling activities are continuing to enhance the ability to predict groundwater behavior in central Alberta.

Turtle Mountain Project: The disastrous rock-slide of 1903, which claimed over 70 lives in the townsite of Frank in the Crowsnest Pass, left the top of Turtle Mountain cracked and fissured. For the past three years the branch has been upgrading the crack monitoring system on the crest of the mountain. An elementary crack monitoring network was established in 1932. In 1980, the network was expanded and upgraded to make use of modern measuring techniques. The main thrust in 1982-83 was the design of systems which will allow monitoring to sub-centimetre precision of movement.

A seismic monitoring network is also being installed to monitor the abandoned coal mine workings beneath the east face of Turtle Mountain. Precise ground surveys, mapping with low level aerophotography and geotechnical mapping were conducted to ensure that any movement which is detected by the various monitoring networks can be properly evaluated.

Table 7

Hydrogeology Branch Summary

Programs	1981-82	1982-83
Groundwater Administration:		
Driller Licences Issued	113	238
Driller Inspections	683	619
Well Complaints	130	100
Drillers' Reports Submitted	7,294	5,856
Information Requests	1,851	1,739
Services to Other Agencies:		
Number of Agencies	5	4
Wells (piezometers) Installed	150	6
Test Hole Drilled	23	4
Groundwater Inventory and Protection:		
Areas Studied	13	8
Piezometers (wells) Installed	12	34
Total Depth Drilled	4,700 (m)	5,800
Test Holes Drilled	52	87

Soils Branch

The Soils Branch is engaged in a diversity of programs with a common theme of describing the soils, geology and groundwater regime in the upper 15 metres of the earth's crust. In 1982-83, emphasis was placed on hydrogeological evaluations of potential sites for hazardous waste facilities, landfill siting and monitoring and irrigation headworks studies.

Hazardous Waste Project: Responsibility for co-ordinating the hydrogeological investigations of potential sites for a hazardous-waste treatment facility continued. Preliminary hydrogeologic office evaluations for 87 sites (19,400 hectares) were completed. The sites are located in the Counties of Beaver, Camrose, and Strathcona; in the Municipal District of Wainwright; in Improvement District 17; and in Special Areas 3 and 4.

A consulting firm, supervised by the branch, completed detailed hydrogeologic investigations on two sites in Special Area 3, on two sites in Special Area 4 and on one site in the County of Beaver. A detailed investigation was initiated near the Town of Swan Hills in Improvement District 17. These detailed investigations included definition of soil, bedrock and groundwater characteristics at a minimum of 25 sites per 65 hectare parcel.

Landfills: There was an increase in the number of regional and modified landfill sites investigated during the year. The primary purpose of the program is to assess existing hydrogeologic site conditions and thus ensure that landfills are developed where the risk of groundwater contamination is minimal.

Groundwater monitoring at regional and other landfills was enhanced by the hiring of a hydrogeologist. Monitoring programs were established at three regional landfills located near Ferintosh (County of Camrose), Wetaskiwin (City and County of Wetaskiwin) and Drayton Valley (Town and County of Parkland). This brings the total number of regional landfills being monitored to nine. Groundwater levels are recorded three times annually and water samples are analysed once each year. The duration and frequency of monitoring will depend on the contamination potential at each landfill. A report will be compieted for each site annually. Monitoring

studies were done at numerous disposal sites and modified landfills, including Carstairs, Ardrossan and Sandy Beach.

Work was begun to provide hydrogeologic site descriptions for 52 permanent and 81 temporary pesticide container sites.

Irrigation Headworks: Soil and shallow groundwater investigations continued on the main canals and reservoirs operated by the department. The branch input to the irrigation headworks rehabilitation program is in the form of reports recommending canal lining and interceptor drain construction. Engineering drain design is provided once the decision is made to construct.

Major inputs continued on the Lethbridge Northern, St. Mary River, Western and Bow River main canals. Work progressed on the detailed groundwater (local and regional) study of the effect of raising Keho Lake (LNID Reservoir) 1.8 metres. Other projects undertaken included seepage investigations on the Mountain View - Aetna main canal, the Highwood - Little Bow diversion canal and the Bullpound Creek lateral (from the Sheerness Blowdown canal).

Reports were provided for design of the Sheerness Blowdown canal, for four reaches of the LNID main canal, and for two projects on the SMRID main canal. Reports on several smaller projects were also completed on the other main canals.

Dryland Salinity: Dryland salinity continues to be a serious and increasing soil contamination problem, particularly severe in southern Alberta. The branch, in co-operation with Alberta Agriculture and Agriculture Canada (PFRA), provided an investigative service to the Dryland Salinity Control Association in the County of Warner to help resolve the problem. Investigations were done on 31 parcels to determine the mechanisms of the problem on each parcel, to outline the groundwater recharge area and to recommend required control measures to the farmer. It was noted that some urban as well as rural areas are affected.

Shallow Groundwater Contamination: An important interdivisional consultative service was provided to deal with contamination of shallow aquifers from industrial plants. Two such groundwater investigations by consultants near Edmonton and Red Deer, were monitored in addition to one on-going investigation/rehabilitation project, also near Edmonton.

An active role was maintained in hydrocarbon leak detection from underground storage tanks. Ten new reports of gasoline leakage were investigated. Gasoline recovery or clean-up operations were conducted by industry and monitored by branch staff. Field investigations (including drilling) by the branch were conducted only when the source of the spill was unclear. Monitoring services were provided in a number of cases.

Country Residential Subdivisions: Although the number of applications referred to the branch were down to 138 from 260 last year, an important service was again offered; namely, assessment of groundwater availability and soil suitability information for sewage disposal and building construction.

The branch, in co-operation with the Regional Land Use Branch, published a revised set of guidelines to be used in determining the near-surface groundwater table and soil permeability characteristics.

Rural Water Development: One hundred and ninety-seven sites were investigated to locate suitable sites for the construction of dugouts and small dams or to determine the cause of seepage from existing impoundments (a large percentage of the rural population of southern Alberta and the Peace River area use dugout water as a domestic supply). A maximum of five test holes were drilled at each site to a depth of six metres, and a letter-report was written to each applicant, stating the results of the test.

Table 8

Soils Branch Summary of Services

Programs	1981-82	1982-83
Landfill siting:		
Site Selection Maps	13	11
Modified Landfill Evaluations	40	49
Regional Landfill Evaluations	25	30
Monitoring	14	16
Groundwater Contamination:		
Sewage lagoon appraisals	55	39
Rural water development (dugout tests):		
Southern Alberta	131	159
Peace River district	43	38
Country residential:		
Subdivision Appraisals	260	138

Technical Development Branch

Soil acidification research and monitoring continued as a major branch program. Activities related to land treatment of wastes, reclamation of disturbed lands and analytical services were maintained at previous levels. Involvement in these areas occurred in various capacities, including investigations, research reviews, data interpretation and consultations.

Waste Utilization: Data analyses for experiments on land application of municipal sewage sludge at Edmonton and Calgary were completed and draft reports prepared.

Wastewater irrigation investigations were conducted for 10 municipalities and industries. A report on wastewater irrigation of aspen was completed. A study of the impact from 10 years of municipal wastewater irrigation on soils and groundwater at Taber, Alberta, was published. The branch is now participating in the final stages of the publication of a Manual on Land Treatment of Municipal Wastes for Canada, which is sponsored by Environment Canada.

Branch participation continued in co-operative projects with respect to oil-well sump fluid toxicity evaluations and oil waste treatment on land.

Reclamation: Reclamation studies continued at the Bow City strip mine where various treatments are being studied for their long-term ability to improve sodic mine spoil. The possible degradation with long term storage of stockpiled topsoil is also being studied.

A study on the use of bottom ash as a barrier to upward salt movement from sodic spoil is nearing completion. Three staff members served on steering committees dealing with major strip-mine reclamation programs.

Soil Acidification: A detailed study of soil sensitivity to acid deposition continued. Additional long-term, soil-monitoring sites were established near Pincher Creek and Cold Lake in an attempt to record possible changes in soil chemistry over time. Technical assistance was given to the establishment of pH monitoring sites adjacent to 18 sour-gas plants.

Analytical Services: Laboratory analyses of soil, water, plants and wastes were conducted for the Earth Sciences Division as well

as for private and other government agencies. A summary of constituents is outlined below:

Soil	chemical	151,443
Soil	physical	5,390
Water	chemical	42,293
Wastes	chemical	450
Plant	chemical	1,102
Microbiological	(samples)	877

Miscellaneous: Branch staff presented a total of seven technical papers at conferences throughout North America.

Advice on irrigation water quality for Etkzikom and Forty Mile Coulee's was provided to Alberta Agriculture.

A staff member served on an Agricultural Canada Task Force to examine federal soils research capabilities in Western Canada.

RESEARCH MANAGEMENT DIVISION

The objectives of the Research Mangement Division (RMD) are to provide timely and authoritative scientific and technical information to other operational units within Alberta Environment; to plan and co-ordinate the scientific environmental planning requirements of the department; and to administer research pertinent to departmental needs on environmental matters. Activities included in these objectives are the identification of long-term environmental research program requirements and the implementation of the chosen programs and projects.

During 1982-83, a report by Dr. E. E. Ballantyne which studied environmental research and its management by Alberta Environment was accepted by the department's Executive Committee. Recommendation 2 of the report states that RMD "will be the research management arm of the department. Its mandate includes the responsibility for planning and management of research programs and projects, co-ordination of interdepartmental and interagency research programs, preparation and publication of research documents, and provision of scientific advice and support services to departmental staff. These responsibilities are covered under Section 8 of the Department of Environment Act (1971)." The Research Management Division will also take on a greater responsibility in the co-ordination of those departmental research requirements handled at the Alberta Environmental Centre at Vegreville.

Divisional Organization: During the reporting year, RMD operated under a matrix program management system. The previous functional management mode, comprised of four scientific teams or systems (Air, Human, Terrestrial and Water), was combined with a program management mode in order to integrate the best features of both organizational systems. Under the new organizational structure, budget allocations were made to ten research programs.

Six of these ten programs were fully active during the fiscal year: Alberta Oil Sands Environmental Research Program (AOSERP), Acid Deposition, Reclamation, Environmental Contaminants, Waste Management and Socio-Economic Analysis.

The first program, AOSERP, is a continuation of a program started in 1975 as a federal/provincial study but taken over solely by the province of Alberta in 1979. Research from all of the other program areas contributes to AOSERP.

A comprehensive program description document was prepared for each of the five other programs, and ongoing research projects were allocated to suitable programs. New projects were also developed to meet the future research objectives of each program. Projects were assigned to appropriate staff members.

The remaining four of the ten programs were Technological Assessment, Risk Analysis, Environmental Assessment, and Environmental Emergencies. They concerned more recently developed research areas and at the year's end were being reviewed to ensure their proper planning. This review process is ongoing within RMD and serves to regularly update the relevance of the division's research.

In the past, the library was a functional unit of RMD. However, this responsibility was transferred to Finance and Administration Services in February 1983.

Operational Activities: In its research support capacity within the Department of Alberta Environment, the Research Management Division identified, funded, managed and reviewed environmental research projects in Alberta. It provided scientific advice to department staff and reviewed research reports and assessed their relevance to the department's responsibility. Many proposals were also submitted directly to RMD during 1982-83 and were reviewed in the light of the division's objectives and program requirements.

During the year, the Research Management Division managed 57 contracts ranging from major inter-departmental and interdisciplinary projects (such as the Cold Lake hydrology studies) to the organization of small internal workshops and the publication of monographs. Twenty-nine research projects were contracted to consulting companies, while another 21 contracts were provided to universities. The remaining contracts were with government agen-

cies or were service contracts related to divisional operations. In addition, 14 research grants were awarded to Alberta universities and professional societies. A total of 27 final reports on research projects were published during the year.

The division endeavored to increase the impact of its funds by augmenting them with funds from other sources. For instance, many of RMD's projects involved external funding, such as from the Heritage Trust Fund, or took the form of co-operative undertakings with private industry. As a result RMD was able to purchase more environmental research with its dollars.

Research in the oil-sands regions of the province was given a high priority by the division. The office at Fort McMurray was used to support studies in the area. The investigation of environmental concerns arising from oil-sands development and in situ recovery continued, with 39 research projects activated involving the oil sands area. The base camp at Mildred Lake also served other government departments and agencies and was made available on a cost-recovery basis to industry conducting environmental research.

A large portion of staff time was spent participating in the departmental, interdepartmental and interagency committees which co-ordinate research programs. The division was represented on 47 committees, 12 being departmental committees and the remainder being interagency or interdepartmental committees such as the Reclamation Research Technical Advisory Committee (RRTAC) and the Federal/ Provincial Long-Range Transport of Atmospheric Pollutants (LRTAP) committees. Involvement in these committees has enhanced the effectiveness of the division and its management capabilities and has ensured that the professional staff have maintained an awareness of current environmental research activities in Alberta and elsewhere.

To further the division's expertise, RMD staff also attended and presented papers at scientific conferences and meetings in a variety of locations in Canada and the U.S. In addition, they sponsored workshops and seminars on various research topics.

Within the administrative arm of RMD, emphasis was placed on streamlining the division's administrative procedures with the aim to eventually implement a computerized management system.

The following descriptions are based on the broad programs referred to above.

Acid Deposition Program: As in past years, research on acid forming emissions and their ecological effects was of major importance in the division during 1982-83. The Acid Deposition Program was designed to plan and implement research specific to Alberta which deals with the environmental impacts and with the medium- to long-range transport of acid forming emissions (oxides of sulphur and nitrogen). In addition, the program will provide scientific information for reviewing and evaluating Alberta's air quality standards and will assist in present and future planning of provincial industrial development. Finally, it will provide a good understanding of the potential for environmental acidification and will aid in sound, long-term environmental management.

The following scientific program objectives were established:

— to characterize sensitive environmental components and develop the methodologies to identify and/or predict environmental deterioration caused by acid-forming emissions;
— to determine the characteristics and quantities of local-source and long-range emissions and to distinguish between their effects on the environment;
— to review, co-ordinate and implement a research program concerning acid forming emissions and their short- and long-term environmental effects; and
— to develop a basis and an approach for preventive strategies and environmental protection.

One of the goals in designing the new Acid Deposition Program was to totally integrate all ongoing research studies. The following key steps were taken to achieve this goal:

— Several of the existing research projects were redirected to account for the episodic nature of acidic deposition and the consequent vegetation response. The components in the overall integration involved continuous measurements of ambient air quality and its interface with vegetation responses at process, whole plant and population levels as well as the corresponding interface with soil nutrient and microbiological processes. These studies were amalgamated to emphasize the program dealing with the response of vegetation communities to aerial emissions which is being conducted in the AOSERP region.
— A document was prepared to define the potential approaches required in interfacing air quality measurements to vegetation responses. This document was submitted to the Departmental Committee on Acid Deposition (DCAD).
— A two-day workshop on "Ecological Monitoring Research" was organized at Red Deer, Alberta. The objectives of the workshop were to address industrial and governmental needs and concerns and to develop plans for long-term research on the impacts of low-level, chronic acidic deposition on forest ecosystems. A proceedings of the workshop was prepared and published by the Research Management Division to assist the planning of the new research program on acid deposition which is being sponsored by Alberta Environment and industry.

The fiscal year saw the continuation of field sampling projects to analyse the chemical constituents of rain and snow in the Athabasca oil-sands area. A satisfactory sulphur deposition model was developed to estimate deposition patterns around selected emissions sources. The creation of a methodology and the application of instrumentation technology for measuring the dry deposition of sulphur dioxide from sour gas plants achieved a high degree of success. These techniques will be used for measuring dry deposition of sulphur dioxide in the AOSERP area.

Two projects concerning the forecasts for sulphur and nitrogen oxides emissions for Alberta to the year 2000 were completed.

The division maintained, on behalf of the department, a high degree of involvement in various Acid Rain/Long Range Transport of Air Pollutants (LRTAP) committees. These committees were made up of representatives from federal and provincial governments and the private sector.

Reclamation Program: Reclamation research by Alberta Environment was co-ordinated by the Reclamation Research Co-ordinating Committee, chaired by the senior manager of the reclamation program. In the province, such research concentrates on determining methods of rebuilding productive soils (physically, chemically and biologically); identifying changes in the quantity and quality of surface water and groundwater following disturbance and reclamation; developing native plant species for reclamation; controlling erosion; and improving materials handling operations.

An RMD scientist continued essentially full-time managerial and administrative responsibilities for reclamation research in association with the interdepartmental Reclamation Research Technical Advisory Committee (RRTAC). In 1982, RRTAC committed approximately $1.5 million to a reclamation research program with sub-programs in the northeast oil-sands region, in the coal-bearing region of the province's agricultural zone and in the mountains and foothills.

A synthesis of reclamation information relevant to Alberta from over 1700 references in the international reclamation literature was undertaken. The final report, designed to provide direction for further research in the province, will be available in the summer of 1983. Approximately 870 references have been collected for inclusion in the second edition of the publication, **Land Surface Reclamation: An International Bibliography.**

An inventory of peat analyses methods from international research institutes has been compiled and synthesized. This inventory will be used by the International Peat Society to help develop standard international methodology.

The senior program manager has occupied the position of Vice-President of the Canadian Land Reclamation Association and is also editor of the quarterly, **Reclamation Newsletter.**

Environmental Contaminants Program: The Environmental Contaminants Program was initiated during 1982-83 to integrate ongoing research efforts with departmental activities and to develop a long-term research strategy in the area of environmental contaminants.

The program objectives include:

— the development of a mechanism for identifying and assigning research priorities to contaminants of concern to Alberta; and
— the development of a mechanism whereby information relative to the fate and effects of contaminants can be accumulated in order to direct mitigative action.

During the reporting period, a series of draft program documents were produced describing the basic program concepts and preliminary research priorities and outlining a tentative research strategy. These documents were circulated to the operational divisions of Alberta Environment and to the Alberta Environmental Centre for comment.

Ongoing research assigned to this program included the second year of a project which identified the chemical components of the products of in situ oil-sands combustion processes and determined associated environmental hazards. Also incorporated into the program was the second and final year of a project designed to develop a model to improve the prediction of phosphorus content in Alberta lakes. A student thesis to produce an improved methodology for calculating nutrient budgets for shallow productive lakes in Alberta was associated with this project.

A major international workshop, the Ninth Annual Aquatic Toxicity Workshop, was organized and funded under the Environmental Contaminants Program in 1982. This workshop was a joint venture between Alberta Environment, the Alberta Environmental Centre, the University of Alberta (Department of Zoology), the University of Calgary (Kananaskis Centre for Environmental Research), the Alberta Oil Sands Technology and Research Authority (AOSTRA) and Syncrude Canada Ltd.

Socio-Economic Analysis Program: Definition of the Socio-Economic Analysis Program was completed during the year and included a five-year research needs projection. The program researches human- biophysical environmental relationships and environmental studies, with its primary concern being social impact assessment and public participation.

With the completion of the 1982 Edmonton area study by the Population Research Laboratory of the University of Alberta, the results of three years of public opinions on environmental issues were analysed and published.

The "Population Turnover in Fort McMurray: Phase 1" study was completed. The majority of persons who participated in the 1979 study of "Family Adjustment in Fort McMurray" were located and a comprehensive questionnaire was designed and pre-tested.

Partial funding was provided in support of the Four Nations Conference (Scotland, Norway, U.S.A. and Canada) on "Community Impacts and Development Issues in Energy Resource Communities" at the Universities of Alberta and Calgary.

Preliminary research was begun on the effects of plant closures on resource communities. In order to select a location which would provide optimum data, demographic and economic parameters were evaluated. The project will assess the socio-economic impacts of plant closures on the quality of life of individuals and families within an as yet undetermined community in Alberta. The appropriate social and economic issues will be decided upon by a thorough review of secondary data sources and through interviews with community leaders.

Background documentation and initial project rationales were developed for research into the cumulative impacts of multi-energy developments. This is an exploratory study designed to identify the effects of several types of energy-related developments taking place at one time in a particular community.

Waste Management Program: The development of the Waste Management Program during the fiscal year was structured along two principal research areas reflecting Alberta Environment's mandate in the field of managing wastes. These two research areas or sub-programs are social policy research and technology research.

Social policy research addresses issues relevant to executive decision making. Specific lines of enquiry are legislative and institutional research, facilities demand forecasting, public perceptions and attitudes, economics of waste management and public participation and education.

Technology research involves problems in engineering design and facilities operations. The proposed lines of enquiry under this sub-program are assessment of existing technology, development of new technology, environmental assessment and identification of specific environmental contaminants. Research in this area will involve waste processing systems, waste disposal systems, recycling technology, materials handling technology and site evaluation hardware.

The Waste Management Program also incorporated appropriate divisions of Alberta Environment and the Alberta Environmental Centre, Vegreville. Research assigned to this program included a study of possible health problems resulting from land disposal of treated sewage.

Environmental Assessment Program: Definition of the Environmental Assessment Program was not fully achieved during the fiscal year, and further examination of the scope and intent of the program will continue. Preliminary discussions defined this area of research as a program for data collection and interpretation in order to describe and evaluate environmental trends and conditions. A number of projects relating to the Cold Lake area and to Turtle Mountain in the Crowsnest Pass were conducted under this program.

Technological Assessment Program: After reviewing the background literature, the Technological Assessment Program was preliminarily defined as "a systematically and generally oriented assessment of the environmental consequences of using a definite existing or foreseen technology." A project was under way at year's end to determine the scope of the program and identify research priorities relevant to Alberta.

The review and assessment by the department of the latest available environmental technologies is an ongoing process. During the year, a research project on the review of the technology available from the control of atmospheric emissions from oil-sands plants was completed by the division.

Risk Analysis Program: This program was initiated by the division in September, 1982, and has yet to be fully defined or implemented. Work in this area has consisted of computer database literature searches, divisional program development and initiation of a project to define and develop a research plan for the program.

Library: In early 1983, the responsibility for the library was transferred to Finance and Administration Services. Library services and activities are explained under that section.

WATER RESOURCES MANAGEMENT SERVICES

P. G. Melnychuk, P.Eng.
Assistant Deputy Minister

R. K. Deeprose, P.Eng.
Director
Technical Services Division

J. W. Thiessen
Director
Design and Construction Division

A. R. Strome, P.Eng.
Director
Water Resources Administration Division

Carl Primus
Director
Planning Division

F. G. Primus
Director
Operation and Maintenance Division

The service has the responsibility for overall management and regulation of the province's water resources.

The objectives of the service are to ensure that the multi-purpose water needs of Albertans are met, to solve water-related problems, and to provide associated engineering services as required by the department.

Policies and programs to meet these objectives are implemented collectively by the five divisions of the service. This is done by providing planning, engineering services and funding for the implementation of water development and control projects; administering and enforcing The Water Resources Act; operating and maintaining water resources projects; and gathering, compiling, and analyzing hydrological information essential for an inventory and for effective provincial water management.

One of the major activities of the service is the implementation of the government's Water Management for Irrigation Use Program. This program involves the rehabilitation of irrigation headworks and canal systems and the development of water supplies for irrigation, industry, and other uses. The objective is to maintain a secure and continuous supply of water to irrigation districts and for all other uses.

Other major activities include: the implementation of a flood protection and water management plan for the Paddle River basin; implementation of a long-term water resources development scheme for the Vermilion River basin; development of an assured supply of good quality water in the Oldman River basin and implementation of a flow regulation reservoir on the Red Deer River (Dickson Dam), together with erosion and flood control works and development of a project to stabilize the water level of Lesser Slave Lake. The concept of river basin planning is a high priority.

The service is responsible for inter-provincial and inter-jurisdictional matters related to the management of water resources and is responsible for implementing federal-provincial water agreements.

The assistant deputy minister served as chairman of the Dickson Dam and Paddle River Dam Review boards which were appointed to review and advise the department on all technical aspects of the projects.

The assistant deputy minister was appointed as the representative of the Government of Alberta on the Prairie Provinces Water Board and the Mackenzie River Basin Committee, and as the representative of the Department of the Environment on the Alberta Water Resources Commission.

Prairie Provinces Water Board (PPWB)

The Prairie Provinces Water Board, established in 1948 by a federal-provincial agreement and reconstituted in 1969, consists of representatives from the governments of Canada, Alberta, Saskatchewan and Manitoba. Its function is to administer the 1969 apportionment agreement which applies to eastward flowing water courses and make recommendations on interjurisdictional water matters related to its terms of reference or referred to the Board.

Apportionment Administration: It was agreed that an assessment of the potential impact that any major project would have on the quantity and quality of water which crosses interprovincial boundaries should be reported on by the appropriate government member. Any concerns are to be reviewed by appropriate Board Committees. During the current reporting period, the Board has been involved in the assessment of three proposed projects, including the potential Cold Lake Oil Sands Project. Interprovincial ground water management, water quality and drainage, as well as apportionment of westward flowing tributaries of eastward flowing streams also received attention.

The measured volume of water flow, the computed volume of natural flow, and the percentage of natural flow represented by the measured flow which passed from Alberta into Saskatchewan in the North and South Saskatchewan rivers during the 1982 calendar year, are as follows:

Table 9

Flow in Cubic Decametres

	Measured	Natural	%
N. Sask. R.	7,280,000	7,470,000	97.5
S. Sask. R.	6,106,700	7,355,200	83

Water Demand Study: The report entitled "Historical and Current Water Uses in the Saskatchewan-Nelson Basin" was printed and released for public distribution. It was also agreed that the Board would not proceed with water demand studies concerned with forecasting future water use in the Prairie Provinces.

Hydrology: The Board's Committee on Hydrology assessed a method of apportioning the flows of westward flowing tributaries of eastward flowing streams. The Committee finalized the report entitled "Procedures of Interprovincial Apportionment of the Waters of Battle, Lodge, and Middle Creeks" which outlines procedures to be used to calculate natural flow for Battle Lodge, and Middle Creeks at the Alberta-Saskatchewan boundary for apportionment purposes. The Board subsequently accepted the report and is preparing appropriate documentation to enact the recommendations.

Groundwater: The Board's Committee on Groundwater monitored progress on the proposed bibliography of groundwater reports in the prairie provinces. The Committee determined that mapping of hydrogeological information of the interprovincial boundary areas is not a matter of urgent concern and agreed that no immediate action should be taken to established cross-section and hydrogeological mapping of interprovincial aquifers.

Mackenzie River Basin

Following release of the Mackenzie River Basin Study in February, 1982, the Mackenzie River Basin Committee has reviewed the implications of the recommendations which were accepted and continues to develop terms of reference to implement the proposed activities. Major issues include securing an agreement among the jurisdictions through which transboundary water management issues can be addressed and implementation of an integrated long-term network of hydrometric, snow, metrologic, sediment, and water quality stations through the basin.

TECHNICAL SERVICES DIVISION

The Technical Services Division is responsible for providing the department with all necessary expertise in river flow forecasting, river engineering, surface water hydrology and surveying. It coordinates the department's operations in the physical assessment of the occurrence, control and effect of surface water in relation to natural phenomena, man-made works and proposed projects.

Alberta River Forecast Centre

The Alberta River Forecast Centre provides river forecasts for flood warning and optimum management of the major water resources of the province. The Centre monitors streamflow conditions and advises on measures to be taken to meet the terms of the Inter-provincial Master Agreement on Apportionment.

Operational Forecasting: In 1982, runoff from snowmelt in the plains area was above normal in many areas of central and northwestern Alberta. Some minor flooding associated with the plains area snowmelt was reported.

Several periods of high flows as a result of rainstorms occurred throughout the summer, particularly in July. Areas west and north of Red Deer, including the Medicine, Blindman and Battle Rivers, experienced flooding in early July. The Wapiti River near Grande Prairie was in extreme flood in mid-July and had a second flood of lesser magnitude in early August. Considerable damage resulted from the Wapiti River flood of mid-July. The Alberta River Forecast Centre issued four sets of high- water advisories over the course of the summer to deal with these flood events.

Several severe thunderstorms occurred during the summer of 1982, and these were analyzed by the Centre to determine their frequency at the request of Alberta Disaster Services.

Weekly reports of streamflow conditions in Alberta were provided for department staff, government agencies, recreation organizations and other interested groups in the form of a weekly river report. An automatic telephone answering service for the general public, with a recorded message describing river conditions, has been instituted.

Water Supply Forecasting: Prior to May, 1982, the water supply outlook for the Saskatchewan River Basin was good. Snow survey results indicated an above normal snowpack, and normal to above normal streamflow volumes were anticipated in the basin. Summer precipitation was generally below normal, however, resulting in lower streamflow volumes than anticipated at the start of the season.

The River Forecast Centre issued Water Supply Outlook Bulletins in the months of March, April, May, June, July and August. A summary was issued in October.

Snow survey results for the beginning of March, 1983, indicated a below-normal snowpack in the mountains and a much below normal snowpack on the plains.

Climatic Network and Data Acquisition: The River Forecast Centre continues to co-operate with the Water Survey Section of the Survey Branch on the installation and maintenance of the Alberta Environment Real-time Hydrometeorological Network. Data from the network have been used extensively and have proven to be extremely valuable for flood and water supply forecasting. Planning continues for the gradual expansion of this network into other areas where the present data base is inadequate to support satisfactory river forecasting services.

Staff of the Centre also routinely participate in snow surveys conducted in the late winter and spring of each year. Data from these surveys are used for spring snowmelt runoff forecasting and summer water supply forecasting.

Special Projects: A Flow Regulation Operations Manual has been prepared for the Dickson Dam. An operational strategy for the Paddle River Dam has been prepared and is presently being refined.

Investigations are being carried out into the use of satellite imagery for use in operational forecasting. The River Forecast Centre is currently receiving satellite images on a regular basis from the Atmospheric Environment Service.

The use of snowpillow data in operational forecasting is also being investigated. Snowpillow data is now incorporated into several forecasting procedures. A paper on the use of snowpillow data in real-time forecasting of snowmelt runoff was presented at the American Water Resources Association International Symposium on Hydrometeorology in Denver, Colorado, in June, 1982.

Some forecasting procedures were refined to make better use of the expanding data-collection network. The forecasting procedure for the Wapiti River has been upgraded as a result of the floods of 1982.

Three hydrologists from India visited the River Forecast Centre during the 1982 forecast season to observe forecasting techniques. They were sponsored by the Canadian government.

Developmental work on the Weather Radar for River Forecasting project is continuing. The Atmospheric Sciences Department of the Alberta Research Council has undertaken this project in co-operation with the River Forecast Centre. The system, which will provide rainfall data for the entire area within a 150 kilometre radius of Penhold at 15-minute intervals, is expected to be in routine operation for the summer of 1984.

River Engineering Branch

The River Engineering Branch provides expertise in the area of river morphology and dynamics. The general areas handled by this Branch are:

— analysis of river processes;
— river erosion protection and river training;
— flooding analysis for land development around rivers and lakes;
— preparation of flood-risk maps;
— design and analysis for flood reduction schemes;
— ice-jam monitoring and control at freeze-up and breakup;
— evaluation of the impact of water management works (dams, weirs, etc.) on the existing regime of the rivers;
— general assessments: River Engineering input to permitting of gravel mining, pipeline crossings, bridges, culverts, intake and outlet work; and
— river data (flood surveys, etc.) collection.

Erosion Protection and River Training: Problem evaluation and preliminary design reports were prepared for:

— Swan Delta cutoff project;
— Oldman River at Fort MacLeod historical site protection;
— Pigeon Creek channel improvements;
— Mountainview regional water intake;
— Whitemud River flood control; and
— Sheerness Blowdown Canal.

Twenty-two other erosion and river training problems were investigated and reported on.

Flooding Analysis: Ninety-eight flooding assessments were done during the year, and 159 subdivision applications were assessed for flood risk as an input to various approving agencies (Planning Commission, etc.).

Flood-risk Maps: Flood-risk maps are prepared so that flood-prone lands are identified. Major reports were completed for:

— Waskasoo Creek at Red Deer;
— Vegreville;
— Athabasca/Clearwater Rivers at Fort McMurray, maps redrawn due to new mapping; and
— the Calgary floodplain study showing the flood-risk areas along the Bow and Elbow Rivers and the Nose Creek is going through the final reviews. Work was also done on the following study areas: Cochrane, Medicine Hat and the North Saskatchewan River through Edmonton.

Ice Jam: Ice-jam monitoring was done for Peace River at the Peace River, the Athabasca River at Fort McMurray and the North Saskatchewan River upstream of Edmonton.

Evaluation of Impact: A study was completed on the proposed Battle River Dam at Gwynne on downstream channel degradation and reservoir sedimentation. Peavine Creek Phase II channel improvement impact was also assessed.

Assessments for Permits and Licences: Sixty-one bridges/culverts, 98 diversions, 59 sand and gravel, 112 pipeline crossings and 46 road referrals were reviewed during the year.

Data Collection and Monitoring: Flood surveys were conducted on the Paddle, Pembina, Sturgeon, East Prairie, North Saskatchewan (Devon to Fort Saskatchewan), Blindman and Medicine, Smoky and Wapiti Rivers.

Hydrology Branch

The Hydrology Branch is a specialized service group of 20 staff members responsible for providing hydrological engineering analyses of the surface water resources of the province. This responsibility includes the determination of annual and seasonal volumes of streamflow; the probability of occurrence and the hydrological characteristics of extreme events; and the provision of information and analyses for water management projects such as river basin planning, reservoir design and lake stabilization. The branch also assesses both the natural and man- altered environmental characteristics affecting hydrology. Preliminary investigations are being carried out to demonstrate the water yield changes through forest management.

During the past year, the branch answered some 230 requests of a minor nature for hydrological analyses or technical reviews of hydrology reports for other groups in the department, such as the Water Rights Branch, the Regional Services Branch, and the Design Branch. Figure 4 illustrates the number of analyses carried out over the previous years.

Also, several major studies were conducted which required significant commitments of manpower and resources and represented the more important accomplishments of a technical nature. These major studies included:

— analysis of floods for floodplain studies on the Bow River at Cochrane and the Elbow River at Bragg Creek;
— reconstruction of historical natural flows for the Peace River at the Alberta- British Columbia border;
— completion of the South Saskatchewan Natural Flow Report; natural flows were determined at approximately 100 locations in the South Saskatchewan River basin;
— instream flow studies on the Sheep River and Red Deer River for Alberta Fish and Wildlife;
— detailed study of the hydrological regime for the Lee Creek watershed;
— lake stabilization and water balance studies for several lakes (for example, Sturgeon Lake) for the development of management plans;
— preliminary water supply assessments for the Water Rights Branch in the Sounding Creek basin, Blood Indian Creek basin, Kennedy Creek basin, Alkali Creek basin, Stornum Coulee basin, and Berry Creek basin;
— update of Battle River natural flows from 1912 to 1979;
— organization, preparation and presentation of lectures for a graduate hydrology course at the University of Alberta;
— reconstruction of Athabasca River natural flows for 1912 to 1980;
— completion of a Probable Maximum Flood report for 21 major reservoirs in Alberta for the Dam Safety Branch;
— development of a new technique for the quantitative evaluation of the impact of land-use changes;
— evaluation of the HYMO model for application in Alberta; and
— water supply assessment of various alternatives for the Town of Fairview water supply system.

Survey Branch

The Survey Branch provides land and water surveys to the department. Data collected are used for the investigation, implementation and management of department projects, for the management of the province's water resources, and to contribute to the data base of land survey and hydrometeorological information.

Land Branch: This section provides engineering and control surveys and arranges for legal surveys, aerial photography and mapping. Engineering and control surveys were provided for a total of 388 projects. Of these surveys, 54 were provided through contracts with private survey firms for a cost of $903,846 of which $664,260 was spent on Heritage Savings and Trust Fund projects. The branch also awarded 65 legal survey contracts at a total cost of $474,197 of which $364,065 was spent on Heritage Savings and Trust Fund projects, and 24 aerial survey contracts at a cost of $360,754 of which $91,831 was spent on Heritage Savings and Trust Fund projects. Funds for these contracts were provided from the branch's operating budget and from funds provided in other budgets for major departmental projects.

By region, some of the larger projects for which surveys were carried out were:

- Peace River
  - Isidore flood control
  - Peavine Creek drainage
  - Buffalo Bay - Horse Lakes
- Edmonton
  - Paddle River Dam
  - Namepi - Kennedy Creeks drainage
- Red Deer
  - Sheerness Blowdown Canal
- Calgary
  - McLean Creek Impoundment
  - Deadfish Creek Canal
- Lethbridge
  - Lethbridge Northern Irrigation District Main Canal and Keho Lake
  - Medicine Hat floodplain surveys

Water Survey: This section provides hydrometeorological data to the department with emphasis on the needs of the other branches of the Technical Services Division. Data are gathered by the field staff within the section and through two federal-provincial cost sharing agreements.

During 1982 the following data collection stations were operated by section staff:

— Lake level	220 stations
— Recording streamflow or water level	60 stations
— Non-recording streamflow	70 stations
— Snow courses	103 stations
— Snow pillows	13 stations
— Non-recording precipitation	24 stations
— Recording precipitation	35 stations

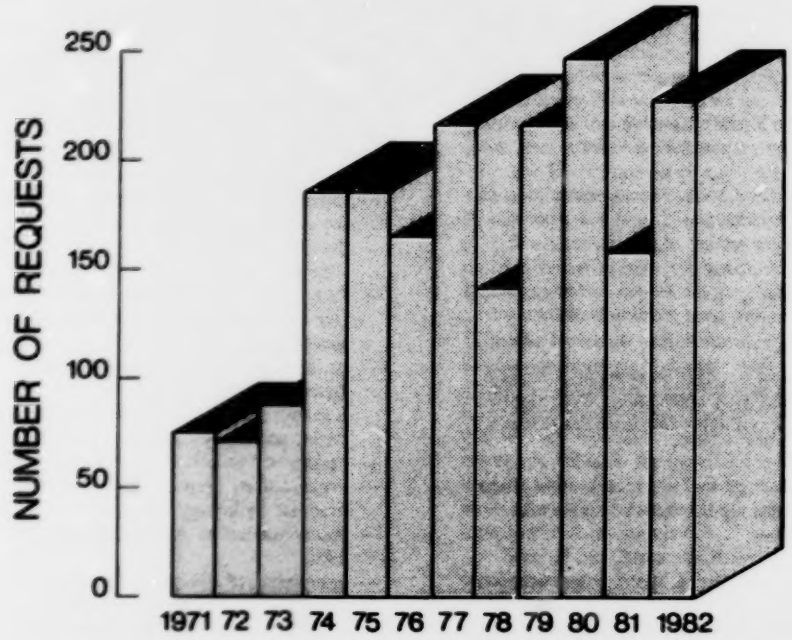
Six recording precipitation stations were installed by Atmospheric Environment Services of Environment Canada under the terms of the Federal-Provincial Cost Sharing Agreement for a cost of $51,000.

Under the Federal-Provincial Cost Sharing Agreement for Water Quantity Stations, 17 new stations were constructed and 456 stations were operated by Water Resources Branch of Environment Canada for a cost of $706,000.

Expansion of the real time hydrometeorological network continued during 1982-83; an additional 12 satellite data- collection platforms were installed.

Data-gathering activities continued in the Spring Creek research basin and the Peace Athabasca Delta during the year.

The Technical Services Division Records Centre provided land survey and hydrometeorological data and related information to users throughout the department, other government departments, consultants and the general public during the year.



HYDROLOGY BRANCH FIG. 4

DESIGN AND CONSTRUCTION DIVISION

The Design and Construction Division is responsible for implementing surface water development and control projects throughout the province. Major categories of these projects include: multi-purpose water supply, storage and distribution, major irrigation works rehabilitation, drainage, flood and erosion control and lake level stabilization.

The implementation of surface water development projects involves field investigations and the preparation of detailed plans in geotechnical, hydraulic and structural specialties. It also involves project management, contract administration, construction supervision and quality control. The division operates a materials testing laboratory and provides drafting services.

The division may be directly involved in all phases of water development projects or division staff may provide administrative and fiscal control only on major projects, such as the St. Mary Main Canal, which are designed and inspected by private sector consultants. Typical water development projects are described in this section of the annual report.

Paddle River Dam: The Paddle River Dam under construction near Rochfort Bridge is funded by the Heritage Savings Trust Fund with project management services provided by the Design and Construction Division. Upon completion the project will provide flood protection to some 12,000 hectares (30,000 acres) of farmland in the Paddle River floodplain.

Geotechnical design of the dam was completed by a consulting firm with field investigations, materials testing, quality control and design co-ordination by the Geotechnical Branch. The Design Branch provided hydraulic and structural designs of appurtenant works such as the low-level outlet works and the service spillway.

The Construction Branch is responsible for managing all major contracts and providing quality control supervision.

Stage I of the main embankment involving foundation preparation and the placement of 700,000 cubic metres of earth fill was completed in December 1981. A second contract for construction of the low-level outlet works was completed in July, 1982. Stage II of the main embankment was just over 50 per cent completed as of March 31, 1982. This contract involves the placement of approximately 2.5 million cubic metres of earth fill and 430 cubic metres of structural concrete for the gate shaft. The low-level outlet gates are being manufactured and a contract was recently awarded for construction of the service spillway. The project is on schedule with an estimated completion in 1984.

Construction Branch

The Construction Branch provides construction management, contract administration and supervisory services for construction of department water management projects.

During the year it provided such services for 44 projects valued at over $32 million.

Lethbridge Northern Main Headworks System Rehabilitation: Located near Fort MacLeod in southern Alberta the project involves improvement of the main canal system to increase its capacity, to prevent erosion to the canal banks and to prevent seepage from the canal. During the year the branch administered three tendered contracts valued at $12.5 million. Two of these contracts involved work on the main canal while the other involved the rehabilitation and modification to the concrete diversion weir and head-gate structure located on the Oldman River on the Peigan Indian Reserve. The canal contracts were completed during the year and the diversion weir will be completed in the fall of 1983.

Deadfish Creek Diversion Project: Located north of the Town of Brooks the project was undertaken to supply water for irrigation and stock watering purposes in an area adjacent to Deadfish and Berry Creeks. During the year three tendered contracts valued at $5.1 million were awarded for construction of a river intake and a

pumphouse on the Red Deer River along with a pipeline and canal to carry the water to the Deadfish Reservoir and Berry Creek. The pipeline contract was completed during the year and the pumphouse and canal contracts will be completed in 1983.

Swan River Delta: Located north of the Village of Kinuso the project was undertaken to provide flood relief to agricultural lands in the Swan River delta and involved the construction of drainage canals in the delta and cutoff channels on the Swan River. During the year two contracts valued at $665,000 were awarded for construction of the cutoff channels, and drainage canals valued at $402,000 were constructed on a force account basis.

Design Branch

The Design Branch is responsible for the hydraulic and structural design of projects initiated by the department. This includes the preparation of preliminary design reports and detailed project designs complete with construction contract documents and cost estimates. Project management is provided for projects that have major hydraulic or structural components.

Project management is being provided for the rehabilitation and expansion of the Lethbridge Northern Main Headworks System and its subcomponents such as the Oldman River and Willow Creek flume crossings and the Diversion Headworks. Project management was also provided for Pat's Creek flood control in the Town of Peace River.

Engineering services in the form of technical reviews and support are provided to other divisions and departments.

The branch also operates a diversified drafting service to accommodate the drafting needs of the division and the department.

Hydraulic and Structural Design: The Hydraulic and Structural Section, in conjunction with the Geotechnical Design Section, prepared 19 preliminary design reports and 17 detailed designs for projects with an estimated construction value of $102 million and $31 million respectively.

While not all projects are described in detail in this report, those where project management is provided by the branch staff are cited.

Lethbridge Northern Main Headworks System: This system consists of approximately 80 kilometres of main canal and associated structures, beginning at the Diversion Headworks on the Oldman River and terminating in Keho Lake. This multi-staged project is divided into more than 15 contracts and is scheduled for completion in 1989.

Work completed to date includes replacement of the Rocky Coulee syphon by an earth embankment canal, rehabilitation of 2.7 kilometres of canal in Reach 6, and rehabilitation of 6 kilometres of canal in Reach 1, located on the Peigan Reserve. Construction of the diversion headworks and the Oldman flume is in progress, with completion scheduled for the fall of 1983.

Detailed designs are nearing completion for 6.5 kilometres of canal rehabilitation on Reach 7A, replacement of the Willow Creek flume and for 5.9 kilometres of canal rehabilitation on Reach 2A. Detailed design work is also underway for 11 kilometres of canal rehabilitation on Reach 7B terminating at Keho Lake.

Pat's Creek Flood Control: This project was constructed under a 75-25 per cent cost-sharing agreement with the Town of Peace River. The project consists of a large multi-plate culvert to carry the waters of Pat's Creek through the town, thereby improving safety and aesthetics and preventing the buildup of ice during the winter months. The fourth and final phase of this project involved connecting the previously installed portions of the pipe with a similar culvert highway crossing. Total expenditures on the project were approximately $3.3 million as compared to the 1979 estimate of $4.1 million.

West Arrowwood Syphon: Water conveyed by the Bow River Canal crosses the valley of West Arrowwood Creek by passing through twin wood-stave pipes. The pipes were constructed in 1935 and 1951 and have progressively deteriorated to the point where both safety and maintenance requirements are a cause for concern.

Detailed designs are being prepared for alternative steel and precast concrete syphons. Both alternatives will be submitted for public tender with subsequent selection of one alternative for construction. The estimated cost of the project is approximately $2 million.

Drafting: The Drafting Section, supplemented with contract staff, provided structural, topographical and general drafting and mapping services to the department.

Major projects this year continued to be centred in preparing preliminary and detailed drawings for contract documents for the rehabilitation of the Lethbridge Northern Headworks System and for the construction of the Paddle River Dam.

Geotechnical Branch

The Geotechnical Branch is responsible for air-photo interpretation, geological engineering and geotechnical investigations and assessments and designs on projects undertaken by the division. Contract documents and cost estimates are produced and project management is undertaken for projects that are largely geotechnical in nature. Engineering services, consulting services and technical reviews are provided to other divisions, departments and agencies within the government.

Project management was provided by the Geotechnical Branch for the Lesser Slave Lake Regulation and the Forty Mile Coulee Reservoir projects. All designs were completed and three more cutoffs were constructed on the Lesser Slave Lake Regulation project, leaving the construction of the weir and associated cutoff to complete the project in 1983. Investigations were completed and the designs finalized for the Forty Mile Coulee Reservoir project.

Geotechnical Design Section: The Geotechnical Design Section is responsible for producing preliminary and final geotechnical designs and contract documents for the water resources projects initiated by the department.

During the past year, the section completed a total of eight preliminary and 12 final geotechnical designs for a variety of projects such as the construction of new and the rehabilitation of existing irrigation headworks systems, the construction of dams for creating recreation reservoirs and the construction of control structures for rectifying flood and erosion related problems. One of the major projects completed during the past year consisted of the preliminary geotechnical design of a dam being considered for construction on the Battle River. The proposed dam would be an approximately 30-metre-high earth-fill structure which would be used for impounding water for multi-purpose use. Another major activity performed by the section during the past year consisted of completing the geotechnical designs of the Lethbridge Northern Irrigation Headworks System.

In addition to providing the detailed design requirements for projects, the section also performed 39 geotechnical reviews for other divisions within the department. The types of review performed varied from evaluating contruction drawings for proposed sewage lagoon and mine-tailing disposal sites to assessing river-bank stability studies and subdivision development proposals.

Project management was provided for the Keho Lake Offstream Storage Reservoir. The investigations and designs were completed and the contract documents are nearing completion for this project.

Geotechnical Services: The Geotechnical Services Section is responsible for the geological engineering, site investigations, material testing and geotechnical consulting contract management for projects undertaken by the branch.

Geological engineering including air photo interpretation has been undertaken for most of the smaller and all of the larger sized projects for which the branch is responsible. A detailed geological report was provided for the Battle River dam site.

Investigation: The Investigation Unit provides investigations including site reconnaissance, drilling, field testing and instrumentation installation and monitoring of water resources projects. This unit also maintains an inventory of granular materials for projects throughout the province.

During the past year the unit conducted geotechnical investigations on 36 projects. Testing and instrumentation installations were done on six projects for the Geotechnical Services Section, other branches and consultants performing studies for the department.

Granular searches were completed for eight projects.

Materials Testing Laboratory: The Materials Testing Laboratory provides testing services in the laboratory and in the field for soil and concrete design and for quality control inspection services during construction.

During the past year the laboratory completed work on 37 projects and provided quality control inspection for eight projects. Major field laboratories have been provided and managed for the Paddle River Dam project and for the Lethbridge Northern Main Canal Rehabilitation project.

A study of laboratory automation was completed and the basic equipment to accomplish automation was purchased.

Office of the Director

The Director of Design and Construction served as a member of Irrigation Council, Chairman of the Irrigation Implementation Committee and Chairman of the Paddle River Implementation Committee. The Director's office maintains a contracts administration unit and administration and fiscal control of the Headworks and Main Irrigation Systems Program financed by the Alberta Heritage Savings Trust Fund.

WATER RESOURCES ADMINISTRATION DIVISION

The Water Resources Administration Division is responsible for the administration and enforcement of the Water Resources Act and Regulations and of the Drainage Districts Act and for financial assistance to local governments under Position Paper No. 5 (Cost-Sharing for Water Resource Management Projects). These responsibilities are carried out by five branches: the Surface Water Rights Branch, Ground Water Rights Branch, Dam Safety Branch, Regional Services Branch and the Administrative Support Branch.

Water Rights

The Surface Water Rights Branch and the Ground Water Rights Branch are responsible for processing applications under the Water Resources Act for licences to divert and use surface water and groundwater. Terms and conditions for the licences are prepared following consultation with other agencies and with input from private individuals or groups. Files and plans are maintained for all projects, and the quantity of water used for consumptive projects is maintained through a system of regular field inspections and mailed water-use reports.

Surface Water Rights Branch

The Surface Water Rights progress report shows a decided increase in activity as new staff attack the outstanding applications. New applications are still at a high level with approximately the same number received as the previous year (see Table 10).

Major input from the water rights area was required for energy projects such as the Mercoal project, McLeod River project, Esso Resources Canada Ltd. at Cold Lake, Gregg River Resources Inc. and Cardinal River Coal Inc. at Luscar and Union Oil Ltd. at Hinton.

Due to licensing concerns, a formal study was undertaken for the west branch of Michichi Creek. The review and analysis of water availability provided by the study will assist in development of licensing constraints and criteria for the basin.

Water Rights staff have provided further input into the water supply and demand studies in the Cold Lake - Beaver River area and into the subsequent development of water-use criteria for the area. Overall status of surface water rights is summarized in Table 11.

Hydro-Electric Section: The Hydro-Electric Section is responsible for the administration of the Provincial Water Power Regulations under the Water Resources Act.

During the 1982-83 year, a high number of major construction and maintenance projects were completed by TransAlta Utilities Corporation. This work included the construction of a spillway and replacement of the timber intake cribbing for the Interlakes Development, construction of two bridges and channeling work prior to the successful testing of the Pocaterra Spillway and spill channel, reconstruction of the Kananaskis Dam south overflow section, replacement of the lower Goat Creek pipeline for the Spray Development, renovations to the Spray Canal Dyke and Whiteman's Pond Dyke, modifications to the Three Sisters Dam, commencement of restoration work on the concrete piers for the Ghost Dam emergency spillway and rock armoring was placed at critical locations along the Brazeau Power Canal.

Section activity has increased as a result of the support of an additional staff member who carried out a large number of inspections and administrative functions.

Field trips were conducted for the purpose of inspecting and monitoring progress on construction and maintenance projects, and the flow conditions in the North Saskatchewan River were monitored during the winter.

Table 10

Surface Water Rights Progress Report

	Dom.	Mun.	Irgtn.*	Ind.	Water Power	Other	Storage	Natural State	Dvrsn.	Total 82/83	Total 81/82
Application Received	92	22	67	33	0	6	34	0	105	359	357
Interim Licences Issued	131	32	156	35	0	9	24	0	123	510	334
Licences Issued	347	55	213	59	0	9	46	0	69	798	296
Permits Issued	0	45	0	320	0	115	0	0	0	480	477
Transfers	409	2	55	7	0	1	1	0	2	477	425
Cancellations	176	12	157	42	0	3	10	0	16	416	208

Table 11

Surface Water Rights In Good Standing As Of March 31, 1983

	Dom.	Mun.	Irgtn.*	Ind.	Water Power	Other	Storage	Natural State	Dvrsn.	Total 82/83	Total 81/82
Applications	94	23	225	21	0	35	62	0	129	589	809
Interim Licences	618	53	540	90	1	242	163	0	574	2,281	2,956
Licences	5,127	201	1,789	255	8	36	120	0	355	7,891	7,002
Net Totals	5,839	277	2,554	366	9	313	345	0	1,058	10,761	10,767

* Includes other agricultural purposes

Table 12

Ground Water Rights Progress Report

	Dom.	Mun.	Irgtn.	Ind.	Other*	Dvrsn.**	Total 82/83	Total 81/82	Total 80/81
Exploration Permits Issued	14	27	2	28	5	4	80	121	103
Applications Received	18	46	1	74	5	9	153	93	128
Interim Licences Issued	14	29	3	71	10	10	137	146	470
Licences Issued	15	49	4	94	81	0	243	95	278
Transfers	0	14	0	3	4	0	21	18	29
Cancellations	6	9	0	15	1	0	31	4	8

Table 13

Ground Water Rights In Good Standing As Of March 31, 1983

	Dom.	Mun.	Irgtn.	Ind.	Other*	Dvrsn.**	Total 82/83	Total 81/82	Total 80/81
Applications	9	23	2	80	1	0	115	103	81
Interim Licences	79	489	11	183	101	25	888	996	962
Licences	28	183	14	136	513	6	880	631	545
Net Totals	116	695	27	299	615	31	1,883	1,730	1,588

* Other, agricultural and storage
** Includes storage

Net hydro-electric generation for the past seven years was:

Year	Megawatt-hours
1976	1,731,000
1977	1,518,000
1978	1,824,000
1979	1,408,000
1980	1,692,000
1981	2,027,000
1982	1,584,000

Ground Water Rights Branch

The Ground Water Rights Branch progress report shows a moderate increase in the level of activity for 1982-83, although the number of applications for exploration permits has actually declined from the previous year (see Table 12). The overall increase may be attributed to the streamlining of data processing through the extended use of word processing.

During the past year, branch activities included expanding the processing of industrial registered wells to the identification and inclusion of those industrial wells currently unauthorized and for which requests for registration were not received. The results realized late in the past year will be more evident in the results of the current year.

Emphasis on the conversion of Interim Licence to Licences has resulted in the number of licensed water wells increasing by about 250 (see Table 13).

There were (215) field inspections carried out over the past year. Most of the inspections (172) were final inspections prior to issue of licences and 43 dealt with complaint investigations or were to obtain information regarding applications.

Regional Services Branch

Regional offices are located in Peace River, Edmonton, Red Deer, Calgary and Lethbridge. Staff from these offices inspect a variety of water-related problems. Requests for inspections are received from the general public and local and provincial government departments.

Regional staff are involved with field inspections, the processing of permit and licence applications for non-consumptive water uses and meeting with local authorities and public and other agencies.

The regional offices administer and manage a program providing cost-sharing for Water Management Projects which had a budget of $6,780,000 available to local authorities. Initiated in 1972 by the provincial government's Position Paper No. 5, the program was revised in 1980 to meet the growing needs of the province and local governments in water resource management. The cost-sharing ratio was changed to 75/25 per cent, with the province providing a grant of 75 per cent of the eligible costs of an approved project. In addition, the responsibility for the engineering feasibility report was transferred to the local authority to allow for greater local control over the schedule and design. Eligible for grants under the program are projects which relate to flow regulation, flood and erosion control, water conservation, lake stabilization and water management on agricultural land.

The regional offices provide technical assistance to landowners who wish to implement a water management project. This assistance includes survey and design services required for the project to be constructed.

The regional offices also provide support to the department's Planning Division for studies on major river basins.

Staff in the regional offices initiate enforcement action when a violation of the Water Resources Act is discovered.

Table 14 summarizes regional activities for the year.

Peace River Region: Spring runoff was uneventful for a fourth consecutive year. The Town of Peace River was under flood alert, but the river slowly receded. Seeding in the Peace River Region was late starting due to the lack of adequate rainfall and resulted in poor crops throughout most of the region. Consequently, inspection requests were minimal.

In late July, heavy rainstorms occurred in the upstream reaches of the Wapiti River. The Grande Prairie water treatment plant was flooded and the system was out of order for two weeks.

A total of 184 inspection requests were received, an increase over the previous year. There were 161 inspections conducted and 115 technical reports processed. The Farm Surface Water Program accounted for 59 of the inspection requests received.

A total of 15 licences were issued for non-consumptive water-use projects. There were 104 permits and 24 letters of authority issued.

Regional staff attended 123 meetings to discuss policies, programs and projects with local authorities and other agencies.

There were 27 interdepartmental meetings attended to discuss matters related to projects and to interdivisional and staff meetings.

Regional staff conducted nine preliminary investigations and 20 projects were constructed or commenced within the fiscal year.

Edmonton Region: There were 348 requests for field inspections on water control and water management problems. During the 1982-83 year, 416 field inspections were completed. As of March 31, 1983, 58 requests were outstanding and required an inspection.

The Edmonton region received 45 new licence applications and 217 new permit applications during the 1982-83 year. A total of 48 interim licences, 22 licences and 209 permits were issued. Four licence applications were cancelled. The region also issued 32 letters of authority. As of March 31, 1983, there were 12 outstanding licence applications and 16 outstanding permit applications that required processing.

In 1982-83 fiscal year a total of 30 projects were funded in the region. Of these projects, four were funded totally by the province. The remainder of the projects were cost-shared with local authorities under the grant program for Water Resource Management Projects.

There were 102 active projects for the Farm Surface Water Management Program in the region as of March 31, 1983. During the fiscal year, 28 new requests for services were received. Construction was undertaken on nine projects.

The following approvals were granted for Farm Surface Water Projects during the 1982-83 year: 12 interim licences, eight licences.

Edmonton region staff were primarily involved with field inspections and processing of inspection reports, processing of permit and licence applications for non-consumptive water uses, review of engineering reports and meetings with local authorities and public and other agencies.

Two new staff positions were added to the Edmonton region during the 1982-83 year to assist with processing of permits and licences.

Red Deer Region: Spring runoff came early during the 1982-83 season. The modest increase in inspection numbers seems to be related to a generally high water table combined with somewhat higher precipitation in the latter part of summer.

There were 291 inspection requests with 315 inspections completed and processed. The outstanding requests were reduced to 59. Approximately one third of the requests and inspections were for the Water Rights Branch.

The above figure includes 19 inspection requests under the Farm Surface Water Management Program. Six projects under this program were implemented and constructed.

Table 14

Summary of Regional Activities — 1982-83 Fiscal Year

Regional Office	Remaining From Previous Year	Requests**	Inspections Completed	Remaining	Technical Reports Processed	Surface Water Program Requests	Cost-Shared Water Management Projects Under Study	Cost-Shared Water Management Projects Started and/or Completed
Peace River	22	184	161	45	115	59	9	20
Edmonton	126	348	416	58	416	28	21	26
Red Deer	83	291	315	59	315	19	10	6
Calgary	77*	196	294	38	294	8	6	4
Lethbridge	129	807	776	160	776	16	10	9
Total 1982-83	437	1,826	1,962	360	1,916	130	56	65
Total 1981-82	218	1,547	1,278	437	1,142	106	74	53

** Include inspections for Water Rights Branch
* Incorrect figure, should read 136

Table 15

Summary of Records Administration Activities

Year	Files Created	Reports Indexed	Files Retrieved	Plans Filmed	35mm Images Produced	16mm Images Produced	Micro Jackets Produced	Duplicate Working Film Produced
1981/82	491	280	20,267	1,430	2,291	133,362	7,074	13,652
1982/83	550	294	36,987	3,274	7,600	259,997	9,095	72,570
Records Disposition								
1981/82	62 cubic feet							
1982/83	79 cubic feet							

Six Water Resource Management Projects were implemented under the Cost-Sharing on Water Resource Management Projects Program and 10 projects were under study during the 1982-83 year.

Nine licences for non-consumptive projects, 90 permits and 25 letters of authority were processed during the fiscal year.

Calgary Region: Snowpack conditions were highly variable in the Calgary region at the beginning of spring, 1982. Conditions ranged from normal at high elevations to much below normal in the foothills and front range of the Rocky Mountains. Below normal precipitation during the winter of 1981-82 produced only 64 per cent of normal runoff in the Elbow River basin and 55 per cent of normal in the Highwood River basin. Above normal precipitation during the spring improved snowpack conditions in the front ranges, and cooler temperatures resulted in minimal depletion of snowpack in higher elevations. By early June, 1982, the possibility of flooding existed in the Bow basin as the mountain snowpack was heavy. However, cool temperatures in June helped keep peak flows to moderately high levels with no flooding.

Precipitation during the summer was below normal for most of the Bow River basin and major water storage reservoirs were at normal levels by October, 1982. Precipitation was below normal while temperatures were above normal for most of the winter 1983. Water supplies are predicted to be below normal for the summer; however, no shortages are anticipated.

During the 1982-83 fiscal year, four Water Resource Management cost-shared projects were constructed. Six more projects are under investigation for future construction.

The Calgary region issued 71 permits and 10 non-consumptive water-use licences under Section 11 of the Water Resources Act in the 1982-83 fiscal year. A total of 294 inspections were completed on water-rights projects, enforcement of the Water Resources Act and complaints related to surface water.

Under the Farm Water Management Program, eight design requests were received and five designs prepared.

Lethbridge Region: The region again experienced below normal precipitation during most months in 1982-83 and another mild winter with above-normal temperatures, particularly during January and February. Spring runoff was barely noticeable, and at year end flows in all rivers in the region are below long-term norms.

Demand for inspection services increased substantially from previous years. Demand for inspection services reflects inventory of existing water use in the Bullshead watershed.

During this report period the Lethbridge region received 45 applications for permits and 25 for non-consumptive water use licences. In response, 48 permits and 24 licences, as well as nine letters of authority were issued by the regional office.

Inspection requests continued to increase over previous years with 776 inspections carried out from a total of 807 requests received. At year end there were 160 inspection requests outstanding.

Additional activities included meetings with local authorities, groups of landowners or other government agencies for the purpose of formulating or implementing cost-sharing projects or for review of ongoing policies. Under the farm surface water management program 16 requests were investigated and 12 reports placed in the hands of the applicants.

Under the grant program four projects were completed, five started and 10 under study.

Dam Safety Branch

This branch is responsible for administering the Dam and Canal Safety Regulation (Alberta Regulation 351/78). Prior to constructing any water-retaining structure, owners are required to obtain an authorization from the Controller of Water Resources. Successful applicants receive an interim licence authorizing construction of a project based upon drawings and specifications submitted with the application. The Dam Safety Branch also monitors the safety of existing structures.

The Controller refers projects eight metres or more in height or 62,000 cubic metres or more in capacity to the Dam Safety Branch for review. During 1982, this branch reviewed 63 applications for licence under the regulation. These included 26 applications from Ducks Unlimited Canada, five from towns, villages or municipal districts and 32 from private farmers.

The Dam Safety Branch continued to monitor existing tailing- and slurry-pond dams related to the coal industry located in the Coal Valley region near Hinton. The start up of new mines in this region also necessitated the construction of a number of new structures which are being reviewed and monitored from conception to final construction. The review of designs and construction of cooling ponds required for the Sheerness and Genesee thermal power stations was also carried out.

Engineering reports evaluating the safety of dams and canals for hydroelectric projects owned and operated by TransAlta Utilities were submitted to our branch. A review of the following developments was undertaken in 1982: Spray Canyon, Three Sisters, Rundle, Pocaterra, Barrier and Upper Kananaskis. Anticipated for next year is a review of Ghost and Bearspaw dams.

Technologists for the Dam Safety Branch installed and monitored instrumentation at the Vermilion Dam and the Paddle River Dam.

Overtopping analyses were carried out for St. Mary and Waterton dams, and dam-break studies were carried out for Ghost and Dickson dams. Dam-break studies were part of a program for emergency preparedness and do not imply concern about the stability of the above dams.

Field inspections and instrument monitoring are a major part of the work carried out in the Dam Safety Program. In 1982 about 110 projects of 1252 on file were inspected as part of the ongoing inspection program. In addition, all of the major irrigation dams were inspected and all of the instrumentation was read at least twice.

Administrative Support Branch

The Administrative Support Branch is responsible for the overall budget, financial management, personnel and general office administration, purchasing, accounts payable, inventory control, records management and control and consultant contract administration for the division. It provides administrative and advisory support to the nine drainage districts in Alberta. It also co-ordinates requests for flood analysis and damage appraisals of claims for Alberta Disaster Services where such claims relate to works or items where the expertise for the evaluation lies within the department.

Financial Administration: This section is responsible for the preparation of the yearly division budget, monthly budget forecasts, the processing and control of documents relating to purchasing, accounts payable, personnel administration and payroll, and it maintains inventory records of fixed assets and furniture for the division.

Records Administration: This section is responsible for the creation, maintenance, retrieval, control and records disposition. These records pertain to the management and licensing of the water resources in the province and are used by the Water Rights and Regional Services Branches in the administration of the Water Resources Act and Ground Water Development Act. The Drainage Council also uses these records in the administration of the Drainage Districts Act. Records are stored in three main media: paper, microfilm and computer. The Water Rights Branch provides the computer data. Table 15 illustrates the work performed and a comparison of increase over the previous year.

The branch head worked with Alberta Disaster Services in co-ordinating the evaluation of the storm and flood events at the following locations: Counties of Lacombe, Ponoka, Beaver, Flagstaff and Grande Prairie, Improvement District Nos. 16 and 19, Municipal District No. 130, Cities of Grande Prairie and Lethbridge area and the Town of Lamont.

On the basis of our flood analysis and other pertinent considerations, Alberta Disaster Services rejected claims from the following: H. Kyeivski, H. Sonnenberg, E. Schatz, Village of Glendon, City of Wetaskiwin, Town of Barrhead, Town of Lamont and F. and R. Bilobrowka.

Damage claims were paid to the Municipal District and Town of Pincher Creek, City of Red Deer and vicinity for 1981 events, Towns of Mundare and Peace River, and the Cities of Lethbridge and vicinity and Grande Prairie for events in 1982.

PLANNING DIVISION

The Planning Division provides the planning necessary for effective water resource co-ordination, development and management. Specific responsibilities include river basin planning, water resource project planning, and benefit-cost analysis and environmental impact assessment of water resource management projects. The division was reorganized during this reporting period and now comprises four branches: Southern Region (Oldman, Bow and Red Deer River basins); Northern Region (North Saskatchewan, Athabasca and Peace River basins); Planning Services Branch, responsible for benefit-cost analysis, environmental impact assessment and water-demand forecasting; and Administration Services Branch, responsible for administrative support to the division. During the past year, division staff supervised 175 consultant agreements totalling approximately $4,000,000. Major activities are summarized below.

River Basin Project Studies

These studies are aimed at ensuring an interdisciplinary and multi-agency approach to major water resource projects.

Buffalo Bay - Horse Lakes Management Program: The purpose of this program is to develop a water and land management plan that would enhance fisheries, wildlife and agricultural production while maintaining the necessary flow through the Buffalo Bay - Horse Lakes delta. During the 1982-83 fiscal year detailed mapping of the study area was prepared to a scale of 1:5000 with one-metre contours and a 200-metre spot elevation grid. Geotechnical field work, consisting of 73 bore holes, and a preliminary hydrotechnical assessment were undertaken to assess the feasibility of three proposed management concepts. These investigations identified the data requirements and the scope of work for subsequent and more detailed studies.

Buffalo Lake Stabilization: Phase II of the study to determine the feasibility of stabilizing the water levels of Buffalo Lake was completed. The scheme would involve a pump diversion from the Red Deer River to Buffalo Lake via Parlby Creek. This project would stabilize the levels of Buffalo Lake to allow orderly development of recreational opportunities and alleviate the agricultural flooding problems that have historically occurred along Parlby Creek downstream of the Town of Alix. While the Phase II study showed that the project is technically feasible, it also revealed that importing Red Deer River water into Buffalo Lake could possibly produce excessive aquatic weed and algal growth which would detract from the full recreational potential of the lake. Environmental studies are under way to further investigate this potential problem.

Downstream Effects of Dickson Dam Operations: A study was initiated to determine how different operational releases would affect land and facilities downstream of the Dickson dam. Various types of public warning systems are being reviewed.

Fort McMurray Flood Damage Reduction: The joint Alberta Environment - City of Fort McMurray study team completed three major tasks during this fiscal year. The first was the production of a 13-sheet series of detailed topographic flood risk maps. The second was a flood damage estimate study involving an extensive survey of about 3,000 commercial and residential structures that are below the 1:100 year flood level. The third task was a preliminary evaluation of 12 flood-damage reduction alternatives. Detailed evaluation of the three most promising alternatives will be carried out after a public review is completed.

South Saskatchewan River Basin Offstream Storage Projects (Forty Mile Coulee, Badger Lake and Crawling Valley): Studies were carried out to predict the environmental and archaeological effects of these proposed projects and to develop mitigating project design measures.

Sheerness Blowdown Canal: The environmental impacts of canal construction were assessed and mitigation measures were developed for incorporation into the project design.

Regional Water Resource Project Studies

These studies were made to help plan regional water resource management:

- Blood Indian Irrigation Feasibility Study to determine the feasibility of irrigating 10,000 hectares of land on the Blood Indian Reserve. After considering technical, economic, environmental, social and administrative factors, the study concluded that the project would be feasible. Implementation of the project could be a positive step toward the betterment of social and economic conditions on the reserve.
- Fishways design studies at Fawcett Lake, Beaverlodge, Driedmeat Lake, Cross Lake, Lesser Slave Lake and Pigeon Lake to aid in upgrading existing stabilization structures at these locations and to provide a background for the future design of regional lake stabilization structures.
- Parlby Creek Flood Control Study to determine the cost and benefits of channeling Parlby Creek upstream of Alix and its effects on the proposal to regulate Buffalo Lake levels by a pump diversion scheme from the Red Deer River.
- Preliminary economic analyses for proposals to enhance recreational opportunities on Iosegun Lake and to reduce or eliminate erosion of agricultural land in the Hawk Hills (West) area.
- Sheerness-Deadfish Operations Information System Study to develop operating guidelines for the Sheerness-Deadfish Irrigation System. A simulation computer model will be developed to guide actual operations.
- Sheerness power plant negotiations to arrange cost sharing between Alberta Environment and Alberta Power Ltd. and TransAlta Utilities Ltd. for construction and operation of an up-sized water-supply system for their generating station. The increased capacity of the system will provide a secure water supply of about 21,000 cubic decametres annually for agricultural, municipal and other uses over a large portion of the Special Areas, which will have a stabilizing influence on the ranching economy of the area.
- Sounding Creek Study to examine the present water supply and demand and to inventory existing projects. This phase of the study was completed. Further development opportunities are being explored, and a number of potential storage sites and drainage works to increase the effective drainage area to these sites are being examined.
- Winagami Lake Provincial Park Study to examine the breakwater for potential plant growth and algal accumulation.

River Basin Planning Studies

The study of a river basin as a complete system is an ongoing water resource planning function that defines interdependent water-related activities in the basin.

The result is a flexible water management plan for the basin, continually updated to meet new conditions but comprehensive enough to give a rational basis to develop specific projects. A basin plan includes an inventory of water supplies and recommended ways of resolving conflicting uses.

Athabasca River Basin Planning Program: This program will establish a plan to manage the basin's water resources. An overview of water quality issues with a review of all available data for the Athabasca River system was initiated in April, 1982. A technical report identifying current and potential water uses in the basin was completed in November, 1982, and a report presenting a detailed analysis of historical natural flows in the Athabasca River basin was completed in October, 1982.

Battle River Basin - Gwynne Reservoir: The two year feasibility study of a 30-metre high water management dam and a 40-million-cubic-metre reservoir on the Battle River near Gwynne, 11 kilometres east of the City of Wetaskiwin, was nearly completed by the end of the fiscal year. Complex foundation conditions were primarily responsible for pushing the cost of this project to an estimated $47 million. This high cost, a small firm outflow availability and a high rate of reservoir sedimentation resulted in the recommendation not to pursue the project. The report concluded that significant improvement in firm flow availability for the Battle River basin could be accomplished only by flow augmentation to Coal Lake from the North Saskatchewan River.

Cold Lake - Beaver River Basin: Based on technical studies conducted since January, 1981, a short-term plan and three alternative long-term plans were formulated to manage the Cold Lake - Beaver River basin water resources. The short-term plan involves the use of local surface and groundwater sources up to 23,000 cubic decametres per year in the basin. The long-term alternatives involve the use of local surface and groundwater sources, construction of a storage reservoir on the Sand River or importation of water from outside the basin. In March, 1983, Alberta Environment Minister Fred Bradley announced that the short-term plan had been adopted by the government. Adoption of the plan included a commitment to employ one of the long-term alternatives. Uncertainties concerning the long-term alternatives will be resolved, and a long-term alternative will be selected well before it becomes necessary to implement one. All the technical reports are complete, and a study report which summarizes the results of the technical work and describes all alternatives and recommendations was underway at year's end.

Etzikom Coulee Basin: The Etzikom Coulee planning program will establish a plan to manage the basin's water resources. A water quality assessment and surface water-flow monitoring program has been undertaken.

Little Bow River Basin: A two-phase study was initiated with the objective of preparing a water management plan for the Little Bow River basin. Phase I (the inventory) was substantially completed with the compiling of reports in the areas of: water quality, land irrigability classification, 1982 irrigation water-use assessment, environmental overview, structures inventory, operations, water supply assessment, livestock inventory and river basin computer modelling. The Phase I final report will provide the necessary background and perspective to the Phase II portion of the study.

McLeod/Athabasca River Basins: Water resources information was compiled for existing and potential coal developments located in the McLeod and Athabasca River headwaters for use in future water management. A consultant was retained in 1982 to provide an overview of potential effects of the coal developments on water quantity and quality in the region and to outline a methodology to assess the significance of these impacts on a regional scale. Both reports were completed and plans for further studies are being investigated.

North Saskatchewan River Basin: As part of the ongoing basin study an analysis of historical, current and future water use to the year 2001 was completed. A consultant hired to assess whether the water balance model developed for the South Saskatchewan basin could be applied to the North Saskatchewan basin concluded that the model is a suitable planning tool for both basins. Instream-flow requirement studies, including mapping of fish habitat along the river, were initiated and are expected to be completed in 1983-84.

Peace River Basin: Forecasts of municipal water supply requirements were completed for 22 communities in the basin as part of a municipal surface-water supply study.

Ross Creek Basin: Additional water-use data were gathered, and a computer model that simulates flows in the basin from 1961 to the present was prepared. This model will be used to determine the effect of current water-use projects in the basin and predict the effects of additional water-use or storage projects.

South Saskatchewan River Basin Planning Program: Liaison was maintained with the management groups of major water users, members of the Legislature, the Caucus Committee on Water Management, the Alberta Water Resources Commission, the Alberta Water Resources Planning Advisory Committee and other government agencies. A report on the historical natural flows for the South Saskatchewan River basin (1912-1978) was finalized. As part of the development of an evaluation methodology for alternative water management strategies, a study which consolidated all known data relating crop water supply to crop yields for Southern Alberta was completed. A second study covering the relation between irrigation water availability and farm income was also completed. An information base on municipal, industrial, agricultural, energy, tourism, recreational and fisheries water requirements has been compiled, and work continued on use of both the revised water-balance model and the water-quality model for scenario development. The groundwater information inventory was in its final draft form at the end of the fiscal year and the inventory of provincial government programs related to water management was completed.

The public participation co-ordinators completed the water-use objectives reports and initiated further work on use of the water-resources management simulator in public presentations.

Special Areas Water Management: Water management studies in the Special Areas included a review of a potential dam on Blood Indian Creek and preliminary design of the Bullpound Creek Turnout from the Sheerness Blowdown Canal. Potential development projects on Bullpound, Berry and Blood Indian Creeks are being explored.

Site Development Program

The site development program is administered by the Operation and Maintenance Division. Program objectives are to:

— restore provincial water-management project construction sites to near natural conditions;
— improve the appearance of existing and future provincial water-management projects; and
— provide those minimal facilities necessary to cope with the public uses of the site.

Planning Division provides the planning support necessary to the program.

Detailed site plans were completed for McGregor Reservoir (Milo site), Dickson Reservoir (north dike site), Western Irrigation Districts Main Canal (pathway system), Deadfish Project (pumphouse site) and Coal Lake (boat launch site). A detailed site plan for the Paddle River Reservoir, incorporating a trout pond and landscape design, was in progress.

Concept plans for Severn Creek Reservoir, Cressday Reservoir and Granlea Reservoir were completed, and a concept plan for Blood Indian Reservoir was in progress.

Additional Planning Studies: The division worked on these additional studies:

— The final phase of the native plant materials study was completed and the results were being incorporated into site development planning.
— A general plan was under development for the layout and design of information and site identification signs.
— A reservoir area management plan for the control of recreational development at Dickson Reservoir was completed in co-operation with the Red Deer Regional Planning Commission and the County of Red Deer.
— A recreational development study was completed for the McGregor, Travers, Little Bow reservoir vicinity in co-operation with the Oldman Regional Planning Commission and the County of Vulcan.

Data Base and Methodology Development

Environmental Assessment: Studies of in-stream flow requirements were continued with a project to monitor the in-stream flow needs (IFN) of fish on the Red Deer River below the Dickson Dam. A document reviewing the various IFN methods was completed.

A reach of the North Saskatchewan River was mapped from color infrared photographs to determine the applicability of this technique for fish habitat determination in environmental assessments.

Economic Evaluation Methodology: Two studies aimed at improving methods for economic evaluation of water resource projects were completed. The first examined the economic value of water to the energy-related processing industries in Alberta. The second study was directed toward the development of an appropriate methodology for evaluating how water storage and drainage projects affect wildlife related sectors of the economy.

Water-use Data: Development of a provincial model to predict sector water use by using economic indicators continued. Further work is necessary to improve the reliability of these forecasts through a broader and more complete data base and additional testing procedures. The quinquennial provincial Industrial Water Use Survey was undertaken and completed in affiliation with the nationwide survey by Environment Canada. Graphic capabilities were added to the computerized water use data storage and retrieval system.

Additional Planning Services

Prairie Provinces Water Board Demand Study: Alberta completed its participation in the Saskatchewan-Nelson Basin Water Demand Study. Provincial inputs to sector reports for agriculture, municipal and industrial, power generation, recreation, environmental considerations and economics were finalized. The final report was completed in December and recommended a number of activities necessary to improve water use data availability and reliability for all three prairie provinces.

Policy and Program Review

Floodplain Management Program: A comprehensive floodplain management program(E keep) has been under development for about three years. The intent of the program is to prevent loss of life and to minimize damage and disruption during floods through the co-ordinated action of provincial and local government agencies to discourage future unwise floodplain development and protect existing development where practical.

Irrigation Reservoir Shoreline Development: A draft policy paper for controlling the development of private, institutional, provincial and municipal recreational facilities around irrigation reservoirs was prepared.

Provincial Drainage Review: The discussion paper on existing provincial programs and policies relating to drainage management was circulated interdepartmen- tally through the Alberta Water

Resources Planning Advisory Committee during June, 1982. Comments were received during summer and fall 1982. Additional exposure of the paper's ideas occurred at the annual meeting of the United Farmers Association in Calgary during March, 1983. The discussion paper evaluates programs and suggests changes needed to develop a comprehensive provincial drainage program. Traditional resource-allocation conflicts, such as wetland habitat management versus farm drainage, are discussed.

Office of the Director

The director was appointed to, or continued departmental representation on, the Alberta Hydro Committee, the Alberta Government Recreation Committee, the Prairie Provinces Water Board Demand Study, the Slave River Hydro Committee, the Resource Integration Committee and the Alberta Water Resources Planning Advisory Committee.

OPERATION AND MAINTENANCE DIVISION

The Operation and Maintenance Division provides the necessary services and activities to operate and maintain provincially owned water-control structures throughout the Province.

The division is structured into three branches and two groups: Irrigation Headworks, Projects Management, Equipment and Materials, Special Projects and Administrative Services.

Both the Irrigation Headworks and Projects Management branches are project oriented, providing operation and maintenance services for provincially owned water projects.

The Equipment and Materials Branch provides warehousing, sales, equipment rental and material purchasing services to the Water Resources Management Service for the Water Management and Development Program.

The Special Projects Group is responsible for planning and implementing unique projects that will become the responsibility of the division upon completion and additionally manages the Site Development Program and the Northwest Alberta Erosion Control Program.

The Administrative Services Group provides all administrative services for the division.

Irrigation Headworks Branch

The branch continues to operate and maintain the irrigation headworks systems which directly serve eight irrigation districts in southern Alberta. They are the St. Mary River (SMRID), Lethbridge Northern (LNID), Bow River (BRID), Western (WID), Mountain View (MVID), Leavitt (LID), Aetna (AID) and Magrath (MID). Two additional irrigation districts, Raymond (RID) and Taber (TID), are served by water conveyed through the works of the SMRID. Approximately 325,000 hectares of land are irrigated by water diverted from the five provincially owned irrigation headworks systems.

The remaining three irrigation districts, Eastern (EID), Ross Creek (RCID) and United (UID), were unable to finalize land title transfers, thereby impeding the proposed take-over of their headworks systems by the province. In the interim, the province is continuing the funding of necessary rehabilitation work to ensure the integrity of the UID and RCID works. Final designs are being prepared for the rehabilitation of the Bassano Dam (EID) under terms of a 1973 federal/provincial agreement.

An agreement finalized on April 30, 1981, between the province and the Peigan Band Council has allowed continued access through the Peigan Reserve to the LNID provincial headworks, acquisition of extra right-of-way for enlargement of the main canal through the reserve, the construction of a new diversion weir on the Oldman River and the relocation and construction of a new flume over the river. Contracts for the construction of these works were let in 1982.

Until the rehabilitation work is completed, the branch will continue to repair and maintain the existing works to assure the integrity of the LNID system. Major activities of the branch on the system included the construction of three farm crossings on the main canal, considerable maintenance work on the Rocky Coulee Syphon and a temporary pumping program for stock ponds.

The telemetry and remote control system on the LNID headgate performed well and is now being modified for installation on the new headgate structure. As a result of the success of the system, consideration is being given to providing telemetry and remote control facilities to Western, Carseland - Bow and Waterton - St. Mary systems.

On the Waterton - St. Mary headworks system, 800 metres of polyvinyl chloride seepage cutoff was installed in the main canal, and a road crossing was rebuilt. Canal banks were protected against scour by placing pit-run gravel. New stop-log guides were installed at the Milk River Ridge Reservoir and Pothole Reservoir outlets and the gates were sandblasted and painted.

On the Mountain View - Aetna system installation of 915 millimetre diameter expansion joints on the Lee Creek Syphon was completed. Rehabilitation of the system continued with upgrading of structures and raising canal banks.

On the Carseland - Bow system, one bridge was replaced and work commenced on the new Highway 24 bridge over the canal. This work also included approximately 335 metres of canal realignment. The canal bank protection program continued with the placement of gravel facing. A new safety boom and additional warning signs were installed at the Carseland Weir.

General maintenance and rehabilitation of the WID system continued and a new section of ditch-rider road was completed near Chestermere Lake. The weir safety program at the WID weir was intensified with the installation of additional signs and an emergency telephone facility at the weir viewpoint.

The division's existing radio communications network in southern Alberta was expanded to the Cypress Hills area with the addition of a radio repeater station.

A computer-based plan-retrieval system was designed and implemented. The system allows for a large amount of technical data such as engineering design drawings, construction plans and similar data to be registered, coded and input into the computer for efficient retrieval.

The land administration section of the branch prepared transfers of land to the BRID in accordance with the 1975 provincial/district agreement. The section also dealt with a number of land use and disposition applications affecting the department's irrigation right-of-way.

A total of 1,302,000 cubic decametres (1,054,000 acre feet) of water was delivered to the irrigation districts during the 1982 season, apportioned as follows:

Table 16

Water Delivered to Irrigation Districts During 1982

	Cubic Decametres	Acre Feet
St. Mary River (including TID and RID)	615,000 dam^3	(498,000 acre feet)
Bow River	348,000 dam^3	(282,000 acre feet)
Western Lethbridge	160,000 dam^3	(130,000 acre feet)
Northern Mountain View - Aetna - Leavitt	145,000 dam^3	(117,000 acre feet)
Magrath	21,000 dam^3	(17,000 acre feet)
	13,000 dam^3	(10,000 acre feet)

Projects Management Branch

The objective of the Projects Management Branch is to operate and maintain provincially owned, non-irrigation water control projects to ensure maximum water resource benefit for Alberta. These dams, reservoirs canals and drainage channels also create wetlands for wildlife habitat and lakes for water-based recreation.

There are 39 water control structures that require operation by the branch, providing flood control, recreation, wildlife habitat water conservation, stream flow regulation and assured water supplies for many towns and villages.

Inspections of provincially owned and Improvement District structures are performed annually and required maintenance is completed. In 1982-83, general and preventative maintenance was completed on 60 provincial or Improvement District projects. Inspections were carried out on 129 various projects throughout the province.

Major Maintenance: In the southern sector, water supply is limited and every effort is made to make the best use of available water. Stream maintenance was required at Fort MacLeod, the upper North Milk River, DeWinton Groyne just south of Calgary and Ross Archaeological Site and the Red Crow Park Site on the Oldman River. Rehabilitation work included the installation of spillway structures at McAlpine Creek Reservoir and the commencement of spillway installation at Reesor Lake.

The central sector repaired eroded channels and dykes or removed log jams on segments of Bearberry Creek, Paddle River, Sundre Flood Control, Pembina River, Sturgeon River and Grout Creek. Construction of a boat launch was completed at Buck Lake.

Major maintenance in the northern sector consisted of excavating, loading and resloping spoil material along 11.5 kilometres of the Kleskun Hills Flood Control project. Cutting, brush burning and erosion protection was completed on 19 Improvement District drainage projects. Rehabilitation work involved the construction of a new weir at McLennan and a redesigned control structure at Donnelly. Repair to one steel gate was required at Heart River Dam No. 2.

Stabilization Projects: Two of the lake stabilization projects that the branch operates are: 1) Gull Lake, located 12.9 kilometres west of Lacombe, which had steadily declining lake levels from 1938 until 1976, when pumping operations began; 2) Lac Ste. Cyr, located 19.3 kilometres southeast of the Town of St. Paul, had declined 2.7 metres since 1959, before pumping began in 1978.

Both lakes are used extensively for recreation such as boating and swimming. Lac Ste. Cyr is also the source of water supply for the Town of St. Paul.

The target stabilization levels were agreed upon by the local counties, villages and the Alberta Government. The purpose for pumping is to ensure the continued recreational potential of Gull Lake and maintain Lac Ste. Cyr at a suitable level to assure St. Paul with a constant water supply.

Pumping at Gull Lake ceased on July 5, 1982, when the stabilization level was reached. Abnormally heavy rainfall and runoff entering Gull Lake in 1982 caused the lake to rise to the stabilization level far ahead of schedule. Pumping into Lac Ste. Cyr has raised the lake to within .19 metres of our target stabilization level as of March 25, 1983.

Emergency Water Supply Program: The Emergency Water Supply Program was established to assist and supervise the pumping of water for communities experiencing municipal water supply problems throughout Alberta.

In 1982-83, 12 communities were assisted with emergency pumping: Vegreville, Barrhead, McLennan, Spirit River, Peoria, Paddle Prairie, Fairview, Alix, Grimshaw, Grande Prairie, Rycroft and Eaglesham.

Equipment and Materials Branch

The Equipment and Materials Branch is a service oriented group providing support to Water Resources Management Services. The branch has several functions:

Equipment Section: The Equipment Section provides an equipment pool service to the Department's Water Resources Management Services.

During the year this section constructed access roads, a boat ramp and landscaped at Jensen Dam, constructed parking stalls and landscaped at the St. Mary's Reservoir, prepared a site for placement of topsoil below Max Bell arena in Calgary, assisted with erosion control on the Western Irrigation District banks, graded banks and service roads and constructed and installed a large fish ladder at Fawcett Lake. At Dickson Dam the section performed general reservoir cleanup and landscaped day-use areas. Stockpiling

topsoil, crushed and pit-run gravel for Dickson Dam by hired contractor was co-ordinated by the Equipment Section.

Materials Section: With warehouse and yard storage facilities in Edmonton, Lethbridge and Grande Prairie, the section manages an approximate $400,000 materials inventory. Management includes the provision of ordering, stock keeping, warehousing, materials sales services and equipment leasing functions directly serving the department's Water Resources Management Services. Receiving and storage services are also provided for all areas of the department as required.

This past year, the section has assisted in the acquisition of equipment for the Regional Water Supply Pipeline to Vegreville and the Regional Sewage Treatment Plant.

Revolving Fund Section: The Water Resources Revolving Fund provides the administrative and accounting activities for the equipment and materials section.

Central Vehicle Services: The vehicle co-ordinator for Alberta Environment administers the vehicle pool for the department throughout the province. Approximately 500 vehicles such as half-ton pick-ups, 3/4 ton pick-ups, suburbans, four-wheel drive vehicles and crew cabs were issued this year on a permanent, seasonal and short-term basis.

Special Projects

The Special Projects Group was formed in response to a need for greater divisional input into the development of projects presently in the planning or construction stage and will be managed by the division upon completion. Special Projects is also responsible for the implementation and management of unique projects and programs which do not fall within the division's normal operation and maintenance functions.

Site Development Program: This program involves the reclamation and revegetation of areas which have been disturbed during the construction of water management projects. Day-use facilities are also established to accommodate existing needs for recreational development, protect wildlife habitat and direct the public away from potentially dangerous areas.

During 1982-83, a new day-use area was developed at Cavan Lake, near Medicine Hat, and construction of day-use areas commenced at Dickson Dam, located near Innisfail. Also at Dickson Dam, 1400 trees were salvaged from the reservoir floor and relocated to a holding area. These trees will be used in the site development of the project. Other projects included rehabilitation and development along the Western Irrigation District canal in Calgary and tree planting at Jensen and St. Mary Reservoirs near Lethbridge.

Maintenance was continued at 12 existing day use sites throughout the Province.

Northwest Alberta Erosion Control Program: The objective of this program is to rehabilitate to acceptable engineering standards those existing drainage ditches and flood control canals in Northwestern Alberta which have deteriorated various degrees since original construction.

Six projects were upgraded in 1982-83, consisting of one major cleanup and five rehabilitation projects. Upgrading involved the installation of six drop structures and 10 culvert crossings, as well as the rehabilitation of 42 kilometres of channel and 12 kilometres of cleanup. Twenty-seven kilometres of channel were cleared in preparation for future rehabilitation. This year's program involved the hiring and supervision of 31 private contractors.

Special Areas: In the Special Areas, staff are involved in preparing for the take-over of operation and maintenance for the Sheerness and Deadfish pumping systems. The systems consist of two major reservoirs, two pipelines, 35 kilometres of constructed channel and 100 kilometres of natural channel. The system has the potential capability for irrigating 8,093.7 hectares and providing domestic water supply to the area.

Administrative Services

The Administrative Services Group administered division activities related to(E keep) personnel, finance, staff development and budget during the past year. The group also provided financial control for a number of revenue producing agreements dealing with the use by others of several provincial water management projects.

Office of the Director

The Director served as the department's representative on the Official's Committee on Native Land Claims as well as the Native Career Opportunities Program Committee.

ENVIRONMENTAL CO-ORDINATION SERVICES

K. R. Smith
Acting Assistant Deputy Minister

J. M. King
Director
Land Reclamation Division

Vacant
Director
Land Assembly Division

K. R. Smith
Director
Environmental Assessment Division

The service promotes the integration of land-related resource development and environmental management to further the department's goal of balancing environmental quality and industrial development.

This goal is supported by requiring environmental impact assessments for major developments issuing development and exploration reclamation approvals, maintaining liaison with regional planning commissions and the Energy Resources Conservation Board, through administration of restricted development areas, and purchase of lands for government programs such as environmental and water-resource development projects.

During the year, the Sand, Gravel, Clay and Marl Surface Operations Regulation (A.R. 228/82) was enacted to provide for reclamation of this surface disturbance which involves more land each year than coal mining.

The Land Reclamation Program under the Heritage Savings Trust Fund continued its activities in research and in the reclamation of abandoned and derelict industrial lands. A total of $3,407,000 was invested in reclamation, of which $1,471,000 was for research.

Alberta Environment and the Energy Resources Conservation Board (ERCB) continued to refine procedures for coordination of environmental matters at ERCB public hearings. The ERCB Rules of Practice were amended to provide for Crown participation in ERCB public hearings for the purposes of presenting evidence, cross-examination and argument.

Total expenditures by the service funded by the General Revenue Fund were $10,909,854. Of this amount, $124,482 was for the administration of the assistant deputy minister's office. The service negotiated, on behalf of the Government Land Purchase Fund, land purchases amounting to $57,098,433. In addition, expenditures on projects funded by the Heritage Savings Trust Fund and administered by the service totalled $5,537,321.

LAND RECLAMATION DIVISION

The Land Reclamation Division administers The Land Surface Conservation and Reclamation Act and the regulations under the act, including the Land Conservation Regulations, the Regulated Coal Surface Operations Regulations, the Regulated Oil Sands Surface Operation Regulations, the Regulated Oil and Gas Pipeline Surface Operation Regulations, the Security Deposit Ministerial Regulations, the Regulated Lake Shoreland Development Operation Regulations, the Sand and Gravel Clay and Marl Surface Operations Regulation, Part 3 Administrative Transfer Regulation, the Council's Administrative Jurisdiction Regulation, the Stop Order Appeal Regulation and the Inquiry Procedure Regulation.

These regulations involve the review of dispositions, applications and impact assessments of proposed surface-disturbing activities and the granting of conditional approvals which ensure that reclamation standards are achieved. The objective is to provide maximum practical protection for the maintenance of shores, watercourses, valleys, sensitive watershed and alpine areas and rural lands.

In addition to the administration of this legislation, the division carries out inspections, reclamation projects and special studies to enforce and improve the practice and standard of reclamation and environmental planning.

The Surface Reclamation Fund, which is administered by this division, consists of security deposits in the form of cash, securities and letters of guarantee required to ensure satisfactory reclamation on projects for pipelines, sand and gravel operations, coal exploration and development and oil sands exploration and development. See the Financial Statement at the end of this annual report for information regarding security amounts received and refunded.

Total expenditures for the division were $2,522,078.

Land Conservation and Reclamation Council

The council, established by the Land Surface Conservation and Reclamation Act, is composed of reclamation officers who monitor surface disturbances to ensure satisfactory reclamation. The reclamation officers may issue orders for reclamation of disturbed lands and certify that reclamation is satisfactory. The council's jurisdiction includes all of the 76 counties, municipalities, special areas, Metis colonies, Native reserves and parts of improvement districts. The total cost of its operations was $1,395,754.

The 20 provincial reclamation officers and 163 municipal government reclamation officers issued 114 reclamation orders, down from 193 a year earlier, and 1,058 reclamation certificates, down from 1,331 the previous year, for the reclamation of abandoned well sites, pipelines, battery sites and coal, oil sands, sand and gravel operations.

Forty-eight reclamation certificates were issued on coal exploration approvals, down two from the previous year. Fifteen reclamation certificates were issued for oil sands exploration approvals up eight from a year earlier. Six reclamation certificates were issued for coal development projects. This was the first year that Reclamation Certificates were issued on Sand and Gravel projects, and six were issued.

Crown Mineral Disposition Review Committee: This committee was established under Part 2, Section 15, of the Land Conservation Regulations (Alberta Regulation 125/74).

The Committee reviewed applications relating to coal, oil sands, quartz and oil and gas. Oil and gas leases and licences constituted more than 90 per cent of the review workload. As a result of that review, a total area of 1,124,873 hectares was offered for sale by open tender.

Exploration Review Committee: This committee was established under Part 3, Section 19, of the Land Conservation Regulations (Alberta Regulation 125/74).

The committee reviews coal exploration applications referred by the Land Conservation and Reclamation Council. The review emphasis is on minimizing surface disturbances, determining that proper reclamation is achievable and determining that proposals are consistent with different agency policies.

During 1982 only 33 programs were reviewed and recommended for approval. This is a 60 per cent drop from 1981, reflecting the impact of economic conditions in the coal industry.

Development and Reclamation Review Committee

Established under Part 4, Section 21, of the Land Conservation Regulations 125/74, the committee's purpose is to provide an interdepartmental and interdisciplinary detailed technical review of major proposed regulated surface-disturbance operations. The committee then recommends operational terms and conditions to be attached to the development and reclamation approvals issued by the minister. The committee submits its recommendations to the chairman of the Land Conservation and Reclamation Council.

During the 1982-83 fiscal year, the committee dealt with the following applications for development and reclamation approval:

— Cardinal River Coal Ltd. — amendments for extension of north haul road, 69 kV power line and Pits 51-C-4, -5 and 50-B-6;
— Union Oil Company of Canada Ltd. — Obed Marsh Project — amendment to mine access road and coal conveyor and transmission line corridor;
— Luscar Sterco (1977) Ltd. — Coal Valley Mine — amendment for Mynheer 'A' Zone Pits 12 and 13;
— TransAlta Utilities Corporation — Highvale Mine — five-year Amendment;
— Gregg River Resources Ltd. — amendments; and
— Forestburg Collieries Ltd. — Paintearth Mine.

Development and reclamation approvals were issued to the following (amendments to existing approvals are noted):

— Fording Coal Ltd. — Edmonton Power — Genesse Mine;
— Cardinal River Coals Ltd. — (Plant East amendment);
— Luscar Sterco (1977) Ltd. — (Silkstone Underground Mine amendment);
— TransAlta Utilities Corporation — Whitewood Mine — (five-year amendment).

As a result of the Energy Resources Conservation Board's hearings on the McLeod River and Mercoal Projects summations were prepared and distributed to committee members to make the Development and Reclamation Review Committee more aware of upcoming applications.

The committee toured the Hinton-Edson area mines in September, 1982, visiting Cardinal River Coals Ltd., Gregg River Resources Ltd., Luscar Sterco (1977) Ltd. - Coal Valley and Union Oil Company's Obed Marsh Project to gain on-the-ground experience and an appreciation of the mining operations.

The Whitewood Future Land Use Study is of considerable interest to the committee, and the members met with TransAlta Utilities Corporation and EPEC Consulting Western Ltd. to discuss the progress made on this study.

Although the guidelines for submission of development and reclamation applications had been updated and rewritten during 1981-82, a futher review and revision was undertaken by the Committee in 1982-83.

Reclamation Branch

This branch is responsible for the reclamation of abandoned or derelict lands; the investigation of material-handling techniques relating to the reclamation of surface-disturbance operations; and providing a soil sampling and analysis service to the department on problem reclamation areas which are under the jurisdiction of the Land Conservation and Reclamation Council.

Reclamation Projects: The Alberta Heritage Savings Trust Fund reclamation program was involved in 120 project sites, which returned the lands to various beneficial uses (see Table 17). Ninety-three projects were located on municipally owned land and 27 on Crown land. The majority of projects on municipally owned lands were for the reclamation of abandoned garbage dumps (42) and abandoned sewage lagoons (22) (see Table 17).

Table 17

Reclamation Projects

Nature of Use	Municipal	Public	Green Area	Total
Access Roads		2	5	7
Sewage Lagoons	20			20
Garbage Dumps	42			42
Mine Hazard Sites	9			9
Sand and Gravel Sites	11	4		15
Siesmic Lines and Coal Exploration Trails			8	8
Water Storage Sites	2			2
R.D.A. Clean Up	1			1
Derelict Areas	2			2
Industrial Sites	2	1	4	7
Abandoned Bridges	2			2
Abandoned Coal Mines	2			2
Abandoned Well Sites			2	2
Brazeau Reservoir			1	1
Reclamation Research				15
TOTAL	93	7	20	135

The mine site reclamation program was very active in the Forestburg, Bow City and Taber areas. At the Forestburg north site, the land was turned over to Alberta Environment for administration and control. Revegetation of the area has progressed extremely well and the land has been leased for grazing and forage production.

The Bow City east site was cultivated and seeded in May. Research plots were established in September to examine the possibility of using mulch as an amendment to sodic spoil. At Bow City west some earthwork was undertaken in June to contour the site and ensure proper drainage. Steep banks around the ponds were cut back to prevent erosion. Most of the rocks and boulders were removed from the site and used as rip-rap for the banks.

At the Taber abandoned mine site the earthwork was completed. The site has been cultivated and seeded. The abandoned mine is now being used as a park for Taber and area residents.

The trust fund was invested in 15 reclamation research projects. The projects entailed various research studies relating to reclamation within the province.

The soil sampling and analysis support service section of the department took 1655 soil samples on 65 individual sites (see Table 18).

Table 18

Soil Sampling Program

Type of Site	No. of Sites	No. of Samples Taken
Abandoned Coal Mines	7	341
Gravel Pits	0	0
Ongoing Coal Mines	2	89
Other	12	190
Pipelines	4	164
Plots	7	417
Well Sites	29	454
Total	65	1,655

Table 19

Subdivision Referral Activities

Planning Authority	Number of Applications 1982	1981	Percentage Change
Battle River Regional Planning Commission	89	136	35
Calgary Regional Planning Commission	265	234	13
Edmonton Metropolitan Regional Planning Commission	143	275	48
Oldman River Regional Planning Commission	124	182	32
Palliser Regional Planning Commission	95	77	23
Peace River Regional Planning Commission	147	218	33
Planning Services Division (Municipal Affairs)	233	496	53
Red Deer Regional Planning Commission	207	355	42
Southeast Alberta Regional Planning Commission	71	100	29
Yellowhead Regional Planning Commission	118	—	
City of Lethbridge	3	11	73
County of Parkland No. 31	46	64	28
City of St. Albert	9	8	14
TOTAL	1,550	2,156	28

Regional Land Use Branch

The branch assesses and evaluates major land-use allocations, including public land-use assignments, subdivision developments and industrial sites. The branch's objective is to prevent the irreversible allocation of high-quality agricultural, recreational and high water-yield lands and quality water bodies to incompatible uses. Total costs associated with this function were $239,397.

Subdivision Referred System: Major urban residential, country residential or cottage resort developments and all proposed subdivisions adjacent to water bodies were reviewed and assesses for potential impact.

The nine regional planning commissions, the planning services division of Alberta Municipal Affairs, the cities of St. Albert and Lethbridge and the County of Parkland No. 31 refer applications to this branch. The branch comments on behalf of the department on compliance with the Land Conservation Guidelines, susceptibility to flooding, bank and slope stability, erosion hazard, surface drainage, availability of a domestic groundwater supply, potential air and water pollution and the suitability of the soil form sewage disposal. Comments lead to recommendations for refusal or conditional approval.

Cottage resort and country residential proposals adjacent to lakes continue to create potential overcrowding and sewage problems. Proposals were under review for major lake subdivisions at Jackfish, Lac La Nonne, Laurier, Muriel and Wabamun Lakes. Much time was taken reviewing these applications with developers and discussing the potential implications of sewage contamination, erosion due to vegetation removal and physical overcrowding and overuse of the lakes.

The number of applications processed decreased dramatically from 2,156 in the previous year to 1,550, reflecting the general downturn in the economy and a large oversupply of country residential lots (Table 19).

Staff represented the department at Alberta Planning Board hearings throughout the province as a result of appeals by subdivision applicants.

In addition to subdivision referrals, staff reviewed development permit appli- cations for various rural municipalities, including the counties of Leduc, Lacombe, Lac Ste. Anne, Strathcona and Wheatland and the municipal districts of Foothills and Rockyview.

Lake Shoreland Regulations: The branch continued the administration of the Regulated Lake Shoreland Development Operation Regulations which were proclaimed on August 24, 1977 (Alberta Regulation 233/77).

These regulations are pursuant to sections 21, 23 and 25 of The Land Surface Conservation and Reclamation Act. Specified areas around the following six lakes were subject to the regulations: Garner, Isle, Lac La Biche, Lac La Nonne, Lac Ste. Anne and Sandy.

Eighteen subdivision and development applications were affected by these regulations. Fourteen proposals were determined not to be subject to the regulations.

Development of land for industrial or recreational purposes and unsubdivided land to be used for residential development will not be allowed until a lake management plan and lake management land-use bylaw have been completed and adopted.

Sandy Lake was removed from the schedule of regulated lakes on May 12, 1982, Garner on September 29, 1982, and Lac La Biche and Lac La Nonne on March 23, 1983, as all requirements of the regulations had been met.

Industrial Plant Sites: Staff were involved in the review of numerous environmental impact assessment reports submitted by proponents for coal mines, gas plants and heavy oil pilot plants. Siting criteria were reviewed for 14 proposed projects in central and northern Alberta.

Staff also attended hearings held by the Energy Resources Conservation Board regarding residential encroachment into known sour-gas and oil fields in the Saddleridge, Okotoks-Mazeppa and West Edmonton development areas.

Regulated Operations Branch

The Regulated Operations Branch pre- pared the operational terms and conditions for the development and reclamation approvals for major pipelines and gravel operations. In addition, the branch provided major input into the review and approval of development and reclamation applications which came before the Development and Reclamation Review Committee. The branch also reviewed major transmission-line applications and made recommendations for ministerial approval.

In 1982, after enactment of the Sand, Gravel, Clay and Marl Surface Operations Regulation, a major function of the branch has been to advertise the Regulation to pit operators and assist them in obtaining the required approvals. This process will continue at an increased pace for the next few years until all operators in the province have been contacted.

Total expenditures of the branch were $619,150.

Linear Projects Section: This section is responsible for the co-ordination of the department's review and approval of major electric transmission lines and oil and gas piplines. The section continued to stress the importance of environmental protection plans for major transmission lines and pipelines reviewed. In particular, topsoil conservation for pipelines on agricultural lands remained a priority.

Transmission Lines: The section reviewed and approved a total of 51 applications for electric transmission lines and substations, down five from last year. Nineteen were for lines 144 kV or less, and nine were for 240-kV lines. Twenty-two substation applications were reviewed.

Pursuant to Section 13 of the Hydro and Electric Energy Act all electric transmis- sion line and substation applications must receive the approval of the Environment minister insofar as they affect matters of the environment.

The review and approval process for electric transmission lines consists of two components:

(a) the preliminary government agency review;
(b) the Energy Resources Conservation Board (ERCB) application review.

Preliminary Government Agency Review: Alberta Environment co-ordinates an environmental review of transmission lines prior to a utility company or municipal corporation making application to the ERCB. Preliminary environmental data submitted by the proponent is forwarded to a number of government departments. The concerns and comments of these departments are then conveyed to the proponent.

ERCB Application Review: After an application has been made to the ERCB, the board refers the application to Alberta Environment. The section co-ordinates an environmental review and provides comments and recommendations to the board with respect to the potential environmental impact of proposed transmission lines.

Section members represent the Crown or assist the Solicitor of the Attorney General's Department in representing the Crown at the ERCB hearings.

The section reviews the ERCB decision reports and evidence presented at the hearings as it affects matters of the environment and makes recommendations to the Minister of the Environment for Ministerial Approval with or without conditions.

Pipelines: The section reviewed a total of 588 applications for pipeline projects in the province, up 84 from the previous year. Of this total, 29 applications required development and reclamation approval pursuant to the Regulated Oil and Gas Pipeline Surface Operation Regulations. All applications were referred to the department by the Energy Resources Conservation Board.

Regulated pipeline applications were reviewed by the department and other government agencies responsible for the management of the province's natural resources. Approvals were granted after reviewing detailed environmental reports consisting of a route selection process and an environmental protection plan. Regulated pipeline projects on agricultural land require soil surveys as part of their application.

The government's objective is to preserve agricultural lands in Alberta. To this end, the section continued to promote better and more practical methods of topsoil conservation during pipeline construction. Non-regulated lines, although generally smaller in size, are given considerable attention because of their numbers and cumulative environmental impact. Those projects affecting agricultural lands and crossing major rivers received major attention. All non-regulated projects are reviewed by the section for compliance with the Land Surface Conservation and Reclamation Act and applicable regulations. Minimum reclamation standards are referred to all operators prior to pipeline construction.

Sand and Gravel Section: In 1982, the Sand, Gravel, Clay and Marl Surface Operations Regulation A.R. 228/82 was enacted. Under this regulation, all large sand, gravel and clay operations on patented land in the province require a development and reclamation approval.

An inventory and advertisement program was initiated during the year to record all operations and to notify the landowner and holder of a gravel lease of the regulation requirements. This program will be continued until all operations on patent land have been recorded and all active operations have received development and reclamation approval.

In 1982, the program focussed on four counties which contained 201 gravel operations. A total of 93 operations required development and reclamation approval. The remaining operations were either inactive or were of a minor size which did not require development and reclamation approval.

Seventy-three applications for development and reclamation approval were reviewed in 1982. Forty-seven development and reclamation approvals were issued to private developers, counties, Alberta Transportation and Alberta Environment operations. The sand and gravel referral system reviewed 72 proposals for surface materials licences and leases for developments on Crown land and 79 proposed highway projects submitted by Alberta Transportation.

Coal and Oil Sands Section: The branch is represented on the Development and Reclamation Review Committee and the Exploration Review Committee and provides recommendations on the reclamation aspects of development proposals. Concerns of other departmental agencies may also be handled by the branch. In addition, the branch assisted the Land Conservation and Reclamation Council in the co-ordination of the review and preparation of responses for coal and oil sands submissions (experimental test sites) which were not referred to the two committees. In 1982, approvals were recommended for two coal applications and 12 oil-sand test operations. This year was the initial year that oil-sand approvals were required for in-situ test sites.

The branch also participates in the periodic inspection of mining operations and provides the reclamation officers with professional and technical support.

LAND ASSEMBLY DIVISION

The Land Assembly Division is responsible for the purchase of lands, for the appraisal and settlement of damage claims, for the administration of the restricted development area regulations (designating transportation/utility corridors and areas requiring special environmental protection) and for the land reservation program.

In the restricted development areas (RDAs), ministerial consent is required prior to most land use changes. Through this mechanism the division is responsible for monitoring and controlling land use in accord with the purposes for which the various environmentally oriented RDAs were established. The RDA regulations are also the basis for implementing the Calgary and Edmonton Transportation/Utility Corridors.

The division appraises and acquires land for the department's programs and also for numerous other government departments.

The division provides the Crown land reservation service for the department. All Crown owned lands required for departmental programs are specifically reserved for those purposes through the Public Lands Division of Energy and Natural Resources. Old reservations are systematically checked to determine whether they are still required. The reservation system provides a means for preventing conflicts among the numerous government programs that make use of Crown lands.

Land Acquisition Branch

This branch is primarily responsible for the administration of Sections 9 and 16 of the Department of the Environment Act and Section 84 of the Water Resources Act. Total expenditure of the branch, including costs of land, surveys, appraisals and administration, was $66,589,056. This amount includes expenditures on land purchased and incidental costs for the Heritage Savings Trust Fund and lands purchased which were funded from the Government Land Purchase Fund. The branch purchased land on behalf of the departments of Alberta Energy and Natural Resources, Environment, Culture, Recreation and Parks and Transportation. The purchases provide for access to fish and wildlife resources, flood control, grazing reserves, historical sites, integrated management areas, landfill sites, parks, reclamation, regional water and sewage, wildlife habitat and urban service corridors.

Purchases were made in the Edmonton, Sherwood Park West and Calgary Restricted Development Areas, the Dickson Dam site, irrigation headworks projects, County of Wheatland regional landfill site and the Paddle River project. Land continued to be acquired for Capital City Recreation Park and for Fish Creek Provincial Park.

Access, Offers to Purchase, Easements, Damage Claims and Rights-of-Way: The total number of inspections and negotiations was 871 compared with 869 a year earlier. This total includes inspections and negotiations for 89 easements and 166 damage claims (up from 141). For the Regional Utility Program, 123 easements were acquired.

Appraisals: In addition to 94 staff appraisals, 125 independent fee appraisals were commissioned to determine market land values for negotiating purposes. The independent appraisals on 27,282 acres (11045 hectares) of land were undertaken by 15 different firms at a total cost of $245,897.

Surveys and Consultants: Twenty-seven legal surveys were carried out by 13 private survey companies at a cost of $104,963. The major surveys were for the Edmonton and the Calgary Restricted Development Areas, the Dickson Dam and the Vegreville Regional Utility Program. Other professional services were acquired at a cost of $103,887.

Restricted Land Use Branch

The Department of the Environment Act (Section 16) provides for the designation of restricted development areas (RDAs) within the province. Thirteen designations have been made since 1974. The need for special environmental management in certain areas and the need for protection of transportation/utility corridor lands have been the two basic reasons for RDA designations, although the purposes for the various RDAs differ somewhat. Administration of the 13 RDAs is the responsibility of the Restricted Land Use Branch.

Within each RDA, subdivision and development applications and, in fact, most proposed land use changes are reviewed to determine whether they conform to the regulations set up for the particular RDA. Approval from the Alberta Environment minister is required before any intensification or change in land use can occur.

During the past year, 222 requests for ministerial consent were received. Of these, 147 were granted approval, 5 were refused and 22 were of a minor nature and did not require consent. The remaining applications were awaiting a decision, withdrawn or regarded as information. The more active RDAs in the province, in terms of applications processed, were the Calgary and Edmonton RDAs (see Table 20).

Once designated, RDA boundaries are not entirely static but may be refined as more information becomes available. Minor amendments involving small deletions of land or clarification of boundaries were made to several of the RDAs.

The Restricted Land Use Branch is actively involved in studies related to RDA programs. For the Edmonton-Devon RDA a study has been completed to assess the physical and ecological characteristics of the North Saskatchewan River Valley. The study will be used to provide a basis for evaluating proposed land use changes in and adjacent to the river valley. For the Edmonton and Calgary transportation/utility corridors studies are underway to deal with drainage issues and to identify the best means of access into and across the corridors.

For the most part, transportation/utility corridors have established primary uses in the corridors as oil and gas pipelines, highways, buffers, electrical transmission lines, utility distribution lines and service roads. The Restricted Land Use Branch has also assumed more responsibility for interim property management, pending actual installation of the various primary corridor components.

Table 20

Ministerial Consents Summary (April 1, 1982 to March 31, 1983)

RDA	Total Requests	Consent	Refusal	No Consent Required	P/W*	TOTAL 1974-82
Blue Ridge	2	2	0	0	0	6
Calgary	105	73	4	11	17	858
Capital City Park	1	1	0	0	0	24
Edmonton	69	44	1	8	16	306
Edmonton/Devon	10	4	0	1	5	101
Edmonton/Fort Saskatchewan	12	8	0	0	4	76
Fish Creek	0	0	0	0	0	11
Fort McMurray	5	4	0	0	1	38
Lethbridge	9	6	0	0	3	52
Pinehurst Lake	0	0	0	0	0	2
Sherwood Park	6	2	0	1	3	51
Strathcona	0	0	0	0	0	4
Turtle Mountain	3	3	0	0	0	9
	222	147	5	21	49	1,538

* Pending or Withdrawn

Table 21

1982-83 Land Purchase From Alberta Heritage Savings Trust Fund

Purpose	Parcels	Acreage	Cost	Cost/Acre
Capital City Recreation Park	3	6	$ 921,620	$153,603
Fish Creek	1	9.26	$ 102,072	$ 11,023
Lesser Slave Lake	0	0	0	0
Irrigation Headworks Improvement	49	542.17	$ 577,726	$ 1,066
Paddle River Project	14	363.01	$ 180,396	$ 497
Total 1982-83 Acquisitions	67	920.44	$1,781,814	$ 1,936
Credit on Prior Year Purchases:				
Fish Creek			$ (69,801)	
Lesser Slave Lake			$ (5,991)	
Paddle River			$ (15,451)	
TOTAL	67	920.44	$1,690,571	

Table 22

1982-83 Division Land Purchases — General Revenue Fund

Purpose	Parcels	Acreage	Cost	Cost/Acre
Access to Fish & Wildlife Resources	5	551.77	$1,110,118	$2,011
Environmental Research	1	easement	$ 1,000	—
Fish & Wildlife Habitat	13	993.39	$ 463,451	$ 467
Grazing Reserves	7	1,107.56	$ 476,483	$ 430
Historical Sites	16	1,992.14	$1,228,250	$ 617
Integrated Management	2	318.00	$ 176,400	$ 555
Landfill Site	3	9.08	$ 27,040	$2,978
Recreation & Parks	11	555.05	$ 744,402	$1,341
Regional Water & Sewer Program code 801	58	30.21	*$ 151,217	$5,006
Water Management	28	474.76	$ 609,613	$1,284
Total 1982-83 Acquisition	293	6,031.96	$4,987,974	$ 827

* Includes incidental costs on Expropriations and Above Ground Appurtanence

Table 23

1982-83 Land Purchases - Government Land Purchase Fund

Purpose	Parcels	Acreage	Cost	Cost/Acre
Calgary Restricted Development Area	8	1,258.52	$36,636,905	$29,111
Edmonton Restricted Development Area	9	955.90	20,461,528	21,406
TOTAL	17	2,214.42	$57,098,433	$25,785

Table 24

1982-83 Land Purchases

Purpose	Parcels	Acreage	Cost
Heritage Savings Trust Fund Land Acquisitions	67	920.44	$ 1,781,814
General Revenue Fund Land Acquisitions	293	6,031.96	$ 4,987,974
Government Land Purchase Fund Land Acquisitions	17	2,214.42	$57,098,433
TOTAL	377	9,166.82	$63,868,221

ENVIRONMENTAL ASSESSMENT DIVISION

The division is responsible for the development, maintenance and co-ordination of the department's Environmental Impact Assessment (EIA) system. Related responsibilities are the co-ordination of public participation programs and provision of services to support the use of remote sensing technology in environmental and resource assessment.

EIAs are required for most major resource developments proposed in the province such as new oil sands mining projects, sour gas processing plants, coal mining projects, power plants, refineries and petrochemical facilities, pipelines, transmission lines, recreational developments and water resource projects.

Alberta Environment and the Energy Resources Conservation Board (ERCB) continued to refine procedures for coordination of environmental matters at ERCB public hearings. The ERCB Rules of Practice were amended to provide for Crown participation in ERCB public hearings for the purposes of cross-examination, argument and presenting evidence. In addition, A Guide to the Content of Thermal Power Plant Applications was prepared and released by Alberta Environment and the ERCB.

Community Affairs Branch

The Community Affairs Branch continued to be responsible for facilitating public involvement in the regulatory procedures used to determine the balance between environmental quality and resource development on specific developments.

Environmental Impact Assessment: Communities were assisted through responses to requests for information and advice on environmental issues and the regulatory process. Branch staff advised proponents on the requirements for public participation programs and monitored proponent programs for conformity to the intent of the EIA guidelines regarding public involvement.

The branch assisted with citizen involvement in 21 industrial projects throughout the province. These included 11 industrial development projects, six coal projects, two oil sands projects, one major transmission line project and one major timber development.

Branch staff also responded to requests from individuals and community groups planning to intervene at Energy Resources Conservation Board hearings where EIA was involved in the proponents' applications. Assistance was also provided to a number of community impact studies, advisory committees, special interest groups and other government branches.

Departmental Projects: Branch staff aided citizen participation in many departmental water resource projects including the South Saskatchewan River Basin Study, the Beaver River - Cold Lake Water Management Study, Lake Wabamun Watershed Advisory Committee, Paddle River Implementation Committee, Buffalo Lake Stabilization Project, Slave River Hydro Feasibility Study, Little Bow River Basin Study, Badger Lake Reservoir Development, Forty-Mile Coulee Reservoir Development, Crawling Valley Reservoir Development and the Lesser Slave Lake Regulation Project.

Assistance was provided to the Hazardous Waste Team Implementation Program, incorporating citizen involvement into the design of a program for the management of hazardous waste in the province.

The Branch was also responsible for the management of the public participation program associated with the hazardous waste program.

The total expenditure for the Community Affairs Branch for the past fiscal year was $496,100.

Environmental Impact Assessment Review Branch

The branch evaluates various projects to determine the need for environmental impact assessment reports and co-ordinates reviews of the projects by government agencies. The branch deter-

mines the appropriate scope and content of EIA documents to ensure their relevance to decisions affecting resource development and environmental quality.

Twenty new projects were referred to this branch in the last fiscal year to determine the need for EIAs. Two new EIAs were called, seven were determined not to need EIAs and decisions are still pending on the remaining referrals.

New project referrals to the EIA Review Branch -- April 1, 1982, to March 31, 1983:

Type of Project	No. of Referrals
Coal	3
Quarries/Gravel Pit	3
Pipelines	3
Hydro Development	1
Gas Plants	3
Industrial	5
Recreation	1
Oil Sands	1
TOTAL	20

The two new EIA projects brought to a total of 10 EIAs currently under review by this branch. Five reviews were completed during the last fiscal year. Two projects were placed on hold by the proponents and the remaining three are still active.

The EIA Review Branch co-ordinated the development of departmental recommendations and advice to the respective committees responsible for selecting proponents who responded to calls for proposals for the Alpine Ski Development, the Brazeau Timber Development and the Prince Rupert Grain Terminal.

A new function of the branch is the co-ordination of activity involved in the preparation and participation of Crown agencies at ERCB public hearings. In the last fiscal year this branch was directly involved in board hearings for three major energy developments and one ERCB inquiry.

The total expenditure for the EIA Review Branch for the fiscal year was $497,710.

Alberta Remote Sensing Center

The services and facilities of the Alberta Remote Sensing Center are available (E keep) to Albertans. The centre uses resource satellite and airborne remotely sensed data for the survey and management of the province's natural resources and for exploration and development in northern Canada. Provincial and federal governments, educational institutions, industry and the public utilized the center's facilities. As well, agencies and persons from outside Alberta, where similar facilities do not exist, used the center on a space-available basis. Remote sensing demonstration projects were promoted, co-ordinated and funded by the center to provide cost-effective applications of remote sensing in Alberta.

The total costs of the center were $294,465.04.

The center's staff and facilities provided assistance to multidisciplinary users in the acquisition, analysis and applications of Landsat (resource satellite) and airborne remotely sensed data. The center's Landsat microfiche facility, image library, prime-scene index and computer access to the federal government's Canada Centre for Remote Sensing Technical Information Service provided users with ready access to Landsat imagery of Canada and technical information.

The center provided users with specialized equipment, including the new digital image-analysis system, and with staff assistance for analyzing and applying Landsat and aircraft multiband imagery. On request, service to the Calgary and Lethbridge areas and other parts of the province was provided. The center's education program provided briefings, lectures, workshops and displays throughout the province. The Eleventh Alberta Remote Sensing Course was conducted with participants from across Canada.

The production and distribution of specially enhanced satellite imagery, developed over the past two years for range-land management, was implemented.

Table 25

EIA Projects Under Review by EIA Review Branch (1982 - 1983)

Proponent	Project	Location	Status
1. Biewag Energy Resources Ltd.	Methanol Project	Lamont County	complete
2. Canadian Occidental Petroleum Ltd.	Sour Gas Plant	M.D. Foothills	complete
3. Dentherm Mines Ltd.	Surface Coal Mine	I.D. 14	inactive
4. Esso Minerals Ltd.	Surface Coal Mine	I.D. 14	inactive
5. Forestburg Coleries Ltd.	Surface Coal Mine	Beaver County	active
6. McLeod River Coal Ltd.	Surface Coal Mine	I.D. 14	complete
7. Mercoal Ltd.	Surface Coal Mine	I.D. 14	complete
8. Shell Canada Resources	Sour Gas Plant	I.D. 20	complete
9. TransAlta Utilities Ltd.	500kV Transmission Line	Edmonton-Calgary	active
10. Western Decalta	Sour Gas Plant	M.D. Foothills	active

FINANCIAL STATEMENT

ALBERTA ENVIRONMENT

SUMMARY OF EXPENDITURES FOR 1982-83 FISCAL YEAR

(Unaudited)

Reference Number	Program/Sub-Program/Element	Sub-Program Element	Program Total
01 00 00	Departmental Support Services		
01 00 01	Minister's Office	$ 136,228	
01 00 02	Deputy Minister's Office	427,122	
01 00 03	Finance & Office Services	1,564,229	
01 00 04	Systems & Computing	1,335,205	
01 00 05	Communications	329,522	
01 00 06	Library	324,163	
01 00 07	Personnel & Organization Development	469,823	
	Total Departmental Support Services		$ 4,586,292
02 00 00	Pollution Prevention and Control		
02 01 00	Program Support	690,286	
02 02 00	Air Quality Management	2,711,784	
02 03 00	Water Quality Management	2,209,474	
02 04 00	Municipal Water and Sewage Management	2,207,354	
02 05 00	Earth Contamination	2,422,856	
02 06 00	Waste Management	5,509,208	
02 07 00	Chemical and Pesticide Management	2,157,024	
	Total Pollution Prevention and Control		17,907,986
03 00 00	Land Conservation		
03 01 00	Program Support	124,482	
03 02 00	Land Conservation and Reclamation	2,522,078	
03 03 00	Environmental Assessment	1,288,275	
	Total Land Conservation		3,934,835
04 00 00	Water Resources Management Services		
04 01 00	Program Support	105,492	
04 02 00	Surface Water Development and Control	64,036,662	
04 03 00	Water Resources Administration	10,110,001	
04 04 00	Operation and Maintenance	7,608,264	
04 05 00	Data Collection and Inventory	6,481,164	
04 06 00	Water Resources Planning and Co-ordination	5,346,264	
04 07 00	Groundwater Development	1,562,797	
	Total Water Resources Management Services		95,250,644
05 00 00	Environment Research		
05 01 00	Environmental Research Co-ordination	1,605,559	
05 02 00	Alberta Oil Sands Environmental Research	1,745,528	
	Total Environment Research		3,351,087

06	00	00	I.D.S.S. Land Assembly		
06	01	00	Program Support	1,764,370	
06	02	00	Environment	1,012,029	
06	03	00	Municipal Affairs	—	
06	04	00	Culture	1,228,260	
06	05	00	Recreation and Parks	743,908	
06	06	00	Energy and Natural Resources	2,226,451	
06	07	00	Economic Development	—	
			Total I.D.S.S. Land Assembly		6,975,018
07	00	00	Interdepartmental Environment Research and Services		
07	01	00	Program Support	2,389,680	
07	02	00	Plant Sciences	1,577,873	
07	03	00	Chemistry	2,387,706	
07	04	00	Animal Sciences	2,515,745	
07	05	00	Environmental Technology	1,750,722	
			Total Interdepartmental Environment Research and Services		10,621,726
			Total Actual Expenditure for the Year		$142,627,588

ALBERTA ENVIRONMENT

SUMMARY OF EXPENDITURES AND REVENUES
FOR THE YEAR ENDED MARCH 31, 1983
(Unaudited)

ALBERTA ENVIRONMENT PROGRAM EXPENDITURES		
Departmental Support Services	$ 4,586,292	
Pollution Prevention and Control	17,907,986	
Land Conservation	3,934,835	
Water Resources Management	95,250,644	
Environmental Research	3,351,087	
I.D.S.S. Land Assembly	6,975,018	
Interdepartmental Environment Research and Services	10,621,726	
TOTAL		$142,627,588
ADVANCED EDUCATION AND MANPOWER EXPENDITURES ON BEHALF OF ALBERTA ENVIRONMENT		
Priority Employment Program (P.E.P.)	96,503	
Summer Temporary Employment Program (S.T.E.P.)	242,388	
TOTAL		338,891
HERITAGE SAVINGS TRUST FUND - ENVIRONMENTAL PROGRAMS		
Irrigation Headworks Improvement	52,274,853	
Land Reclamation	3,145,044	
Capital City Park	921,620	
Fish Creek Park	453,238	
Paddle River Basin Development	9,848,419	
Lesser Slave Lake Outlet	450,963	
TOTAL		67,094,137
TOTAL ENVIRONMENTAL EXPENDITURES		$210,060,616
STATEMENT OF REVENUE COLLECTED BY DEPARTMENT		
Water Diversion Permits	11,838	
Water Well Drilling Permits	7,694	
Water Power Rentals	309,012	
Department Miscellaneous	176,049	
Rural Water Development Program	2,550	
Previous Year Refunds	811,696	
Community Services Program	225,324	
Industrial Water Diversion	59,299	
Water Resources Revolving Fund	2,865,526	
Brazeau River Development Cost Recoveries	4,418,328	
R.D.A. Property Revenue	28,972	
TOTAL REVENUE COLLECTED		$ 8,916,288

SURFACE RECLAMATION FUND

FINANCIAL STATEMENT

MARCH 31, 1983

Auditor's Report

Balance Sheet

Notes to the Financial Statement

ALBERTA LEGISLATURE

OFFICE OF THE AUDITOR GENERAL

AUDITOR'S REPORT

To the Members of the Land Conservation
and Reclamation Council

I have examined the balance sheet of the Surface Reclamation Fund as at March 31, 1983. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as I considered necessary in the circumstances.

In my opinion, this financial statement presents fairly the financial position of the Fund as at March 31, 1983 in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

C.A.
Auditor General

Edmonton, Alberta
June 21, 1983

SURFACE RECLAMATION FUND

BALANCE SHEET

AS AT MARCH 31, 1983

	1983	1982
ASSETS		
Deposits in trust (Note 2)	$4,649,977	$3,892,416
Securities in trust with the Province of Alberta	150,000	160,000
	$4,799,977	$4,052,416
LIABILITIES		
Trust Fund (Note 3)	$4,799,977	$4,052,416

The accompanying notes are part of this financial statement.

SURFACE RECLAMATION FUND

NOTES TO THE FINANCIAL STATEMENT

MARCH 31, 1983

Note 1 Authority

The Surface Reclamation Fund operates under the authority of the Land Surface Conservation and Reclamation Act, Chapter L-3, Revised Statutes of Alberta 1980. The purpose of the Fund is to hold security deposits received pursuant to the Act as an assurance that satisfactory land surface reclamation will be performed. Since all interest received by the Fund is allocated and subsequently paid to depositors, no surplus or deficit arises on the Fund's operations.

Note 2 Deposits in Trust

Deposits in trust consist of deposits in the Consolidated Cash Investment Trust Fund of the Province of Alberta.

Note 3 Trust Fund

Transactions in the Trust Fund are summarized as follows:

	Cash Deposits	Securities	1983 Total	1982 Total
Balance at beginning of year	$3,892,416	$ 160,000	$4,052,416	$6,906,349
Security deposits received	1,976,990	1,420,000	3,396,990	1,291,200
Interest received	501,664	-	501,664	717,416
	6,371,070	1,580,000	7,951,070	8,914,965
Security deposits returned	1,721,093	1,430,000	3,151,093	4,862,549
Balance at end of year	$4,649,977	$ 150,000	$4,799,977	$4,052,416

Note 4 Bank Guarantees

In addition to the deposits in trust and securities shown on the balance sheet, the Fund held bank guarantees as at March 31, 1983 in the amount of $22,444,823 (1982 $15,995,495).

Note 5 Approval of Financial Statement

This financial statement was approved by management on June 21, 1983.

WATER RESOURCES REVOLVING FUND

FINANCIAL STATEMENTS

MARCH 31, 1983

Auditor's Report

Balance Sheet

Statement of Operations and Deficit

Statement of Changes in Financial Position

Notes to the Financial Statements

OFFICE OF THE AUDITOR GENERAL

ALBERTA LEGISLATURE

OFFICE OF THE AUDITOR GENERAL

AUDITOR'S REPORT

To the Minister of Environment

I have examined the balance sheet of the Water Resources Revolving Fund as at March 31, 1983 and the statements of operations and deficit and changes in financial position for the year then ended. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as I considered necessary in the circumstances.

In my opinion, these financial statements present fairly the financial position of the Fund as at March 31, 1983 and the results of its operations and the changes in its financial position for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

C.A.
Auditor General

Edmonton, Alberta
August 30, 1983

Statement A

WATER RESOURCES REVOLVING FUND

BALANCE SHEET

AS AT MARCH 31, 1983

	1983	1982
ASSETS		
Current:		
Accounts receivable	$ 366,355	$ 881,298
Materials, at cost	386,339	342,826
Prepaid expense	7,392	-
	760,086	1,224,124
Fixed:		
Equipment, at cost	4,743,551	4,052,803
Less: Accumulated depreciation	1,768,070	1,413,076
	2,975,481	2,639,727
	$3,735,567	$3,863,851
LIABILITIES		
Current:		
Accounts payable	$ 402,682	$ 795,121
Provincial Treasurer's advance	3,461,492	3,087,566
	3,864,174	3,882,687
Deficit, Statement B	(128,607)	(18,836)
	$3,735,567	$3,863,851

The accompanying notes are part of these financial statements.

WATER RESOURCES REVOLVING FUND

STATEMENT OF OPERATIONS AND DEFICIT

FOR THE YEAR ENDED MARCH 31, 1983

	1983	1982
Revenue:		
Material and gas sales	$ 297,144	$7,339,427
Less: Cost of goods sold	276,182	7,321,328
Gross profit on sales	20,962	18,099
Equipment rental	1,953,832	880,544
	1,974,794	898,643
Expenses:		
Operation of equipment	1,197,902	481,078
Equipment rental	484,690	20,933
Depreciation	438,297	385,333
Shops	26,959	24,753
Office supplies	15,978	12,551
Communications	4,825	4,057
Freight and postage	1,446	2,274
Other	1,130	1,761
	2,171,227	932,740
Operating deficit for the year	196,433	34,097
Gain on disposal of equipment	86,662	29,745
Deficit for the year	109,771	4,352
Deficit at beginning of year	18,836	14,484
Deficit at end of year	$ 128,607	$ 18,836

WATER RESOURCES REVOLVING FUND

STATEMENT OF CHANGES IN FINANCIAL POSITION

FOR THE YEAR ENDED MARCH 31, 1983

	1983	1982
Funds were provided from:		
Deficit for the year	$(196,433)	$(34,097)
Depreciation	438,297	385,333
Funds from operations	241,864	351,236
Increase in Provincial Treasurer's advance	373,926	512,373
Proceeds from disposal of fixed assets	88,492	36,385
Insurance proceeds	2,976	-
	707,258	899,994
Funds were applied to:		
Purchase of fixed assets	778,857	635,177
Increase (decrease) in working capital	(71,599)	264,817
Working capital at beginning of year	429,003	164,186
Working capital at end of year	$ 357,404	$429,003

WATER RESOURCES REVOLVING FUND

NOTES TO THE FINANCIAL STATEMENTS

MARCH 31, 1983

Note 1 Authority

The Water Resources Revolving Fund operates under the authority of the Water Resources Act, Chapter W-5, Revised Statutes of Alberta 1980.

Note 2 Significant Accounting Policies and Reporting Practices

(i) Depreciation is calculated on a straight-line basis over the estimated useful life of the assets at the following rates per annum:

General equipment	- 20%
Light mobile equipment	- 25%
Tractor units and heavy equipment	- 3 1/3 to 12 1/2%
Aluminum water pipe	- 6 2/3%
Small equipment	- 33 1/3%

(ii) Major overhauls, significantly extending the life of equipment, are depreciated on a straight-line basis over periods not exceeding five years.

(iii) Materials are valued at weighted average cost.

(iv) Certain administration and other costs are provided at no charge by the Province of Alberta and accordingly are not reflected in these financial statements. These costs include salaries and wages, certain overheads and the rental charges for the Edmonton, Lethbridge and Grande Prairie warehouses.

Note 3 Comparative Figures

The 1982 figures have been restated where necessary to conform to 1983 presentation.

Note 4 Approval of Financial Statements

These financial statements were approved by management on August 30, 1983.

POOR

QUALITY

ORIGINAL